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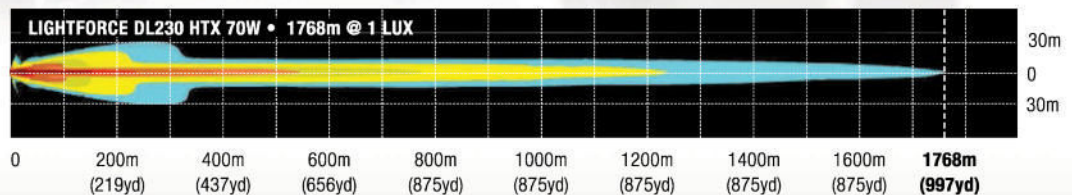
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THE GOOD FIGHT

Since its beginnings almost 17 years go, 4WD Action has always had one aim - to show regular Aussies how to get out in the bush more often without having to spend more cash than they need to. In fact, that's what made me pick the mag up all those years ago, even before I landed the dream job to end all dream jobs of writing for 4WD Action. We've always been about getting out there and seeing more of Australia without having to spend a million bucks. 4WDing is for everyone - it's not an exclusive club where only those who have the latest and greatest accessories get to participate. Whether you've got a twenty year old wagon or you're fortunate enough to own something newer, we all have a common bond in our love for heading bush whenever we can.

I'm proud of the fact that 4WD Action is put together for everyday Aussies who love to head bush. We don't aim to please the bloke who earns hundreds of thousands of dollars and is more concerned about polishing his shiny bullbar than he is about getting out around a campfire. It's gotta be that way, because that's who we are - we use our 4WDs like they were built to be used, we're obsessed with camping and we wouldn't have it any other way. We put our money where our mouths are. This year I was lucky enough to head to Cape York for the 4th time, and I did it on a smaller budget than ever before. And you know what? With three mates piled in the old Cruiser, I've never had a better time. That's living!

We constantly fight for a better go for our readers, whether it's taking up battles like anti-bullbar legislation, increased camping fees across the country or the eye-watering price of some 4WD accessories. Along the way we've put people offside - groups who claim to campaign against track closures but seem to be little more than a paycheck for the organisers, some 4WD associations that only care about the interests of the tiny minority of 4WDers that are their members, companies that jack up prices on their products to the point where only the elite few can afford it, blokes who came on a couple of our DVD trips and now think they're the next Malcolm Douglas.

While way too many people in the 4WD scene are only interested in themselves and their mates, you can take it to the bank that 4WD Action will always be about a better deal for all 4WDers. Just take a look at this issue, for example. In our massive diesel performance and upgrades guide we've asked all of our advertisers to offer a cracking deal for you. That means by buying this issue you now have access to thousands of dollars' worth of savings for getting your diesel running the way you want it to.

4WDing isn't about how deep your pockets are. It's about how much you love heading bush.

Enjoy the issue.
Cheers!

Brendan

Brendan Seymour
Editor

Okay, so I wasn't even invited to take part in the blokes v girls cooking challenge on this issue's DVD, but I can still cook a mean bacon and egg roll!



2016 DIESEL UPGRADES GUIDE!

This issue we've brought you an incredible 39 pages worth of the very best diesel upgrade expert advice available. Whether you're looking for more power, better economy or good old reliability, we've got you covered!

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How do you get your greasy hands on this great prize? Simple – send us a letter that shows you having the time of your life on the tracks, what you've done to your 4WD, or something else exciting you've seen while out 4WDing.

Email your letters and photos to 4wd@expresspublications.com.au with 'Readers Write' in the subject line, or post them to Readers Write, Australian 4WD Action, 37 Carnarvon St, Silverwater NSW 2128. Remember to include your full name and the suburb or town you live in.

LETTER OF THE MONTH WINNER

GETTING OUT THERE

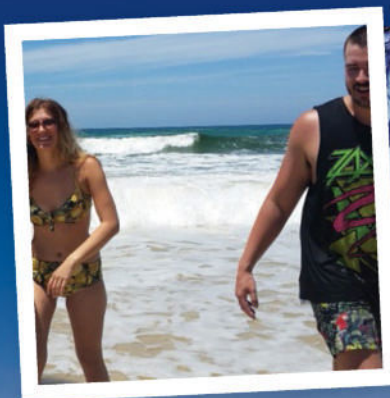
G'day 4WD Action, just wanted to write into you guys and let you know that your recent article on weekend getaways has really inspired me to pick up my act and plan some trips to local destinations that are both easy to get to and are inexpensive to boot. I write this letter in the hope that I might be able to inspire others that are in a similar situation as me – adventure seekers on a shoe string budget.

In the past I have had the tendency to get hung up on thinking about all of the accessories and gear I need to make those spontaneous weekend getaways happen; with my Fiancé and I tying the knot early next year there was very little room in the budget for turning the Jimny into the Taj Mahal of weekend getaway rigs.

After reading your camping set up article I had an epiphany! I've discovered that a few choice items such as a double swag, a roof basket, a couple of chairs and a decent esky to keep the beers cold (all of which have cost me under \$500) are all we need to get out there and see some of the best places on offer. Moreton Island and North Stradbroke Island are a couple of our favourites.

So, don't get hung up on what you don't have, there's always going to be more accessories on every 4WDers list. With a little planning and a few compromises (yes I'm talking hot showers and air conditioning), you can get out and experience some of the best that this country has to offer without blowing the bank.

Great way of looking at it James, and hopefully your letter inspires more to do the same. Every weekend you stay at home because you don't have this product or that, is a weekend you'll never get back. Sort the basics like a swag and a roofrack out, and the rest of the gear can come over time. Onya mate, go the mighty Jimny! Brenno



Cheers,
James Brown



DECISIONS DECISIONS

Hey there 4WD Action,

I am fairly new to the country, 4WDing and the magazine. I have in this short space of time, fell in love with all three!

I do however find myself in a predicament. You see, I bought our family a 2014 VW Amarok, 8 speed auto highline, mainly because of the good reputation VW has and its driving comfort on the tarmac. I figured that the ute would mainly stay on road and would not go off-road that often...boy was I wrong.

I find myself in two minds at the moment:

1. Buy a more serious off-roader like a GQ Patrol or 80 Series Cruiser, to handle the rough stuff or,
2. Spend the money on mods like a bulbar, lift kit, bigger tyres, snorkel, roof rack, rock sliders, scrub bars etc.

The Amarok is our only vehicle currently and I feel "sorry" for it in a sense, but I love going off road and do have to give a lot of obstacles a skip as the Amarok would just not be up to it, in my opinion. What would you recommend I do?

Thanks for a great magazine, keep it up!

Cheers,
Juandre Coetzer

Good question mate. Those Veedubs are good solid bits of gear, but the question you need to ask yourself is just how much of the really tough 4WDing you plan on doing. The autos miss out on a low-range gearbox but make up for it somewhat with an extra-low 1st gear that's only engaged in off-road mode, sort of a Clayton's low-range transfer case. Put a couple of inches of lift, some mud tyres and barwork on the Amarok and it will be a fantastic camping and touring 4WD, but it'll never be pure low-range machine that a Cruiser or Patrol is. Modern dual cabs excel in many areas - they're very comfortable, are great at towing, and can be heavily modified, however, in your situation it sounds like learning the ropes with an older 4WD might be the best move for you. We're massive fans of older trucks here at 4WD Action for people just cutting their teeth in 4WDing and also looking to get into the really rough stuff, so if it was us... I hate to say it, but I'd sell the Amarok and buy a good turbo-diesel 80 Series. Accessories are



cheaper, they're easier to work on and will take you anywhere in Australia. You're also much less likely to stress if you put the odd pin stripe or bit of panel damage on an old Cruiser or Patrol as you tackle more challenging tracks, whereas damaging a brand new dual cab would hurt the back pocket a lot more.. It all comes down to being honest about how much hard low-range work you're going to do with it. All the best!
Brenno

Got a tricky tech question that you can't get answered? Different mechanics or mates telling you different things? Maybe you're not sure if you're getting the sales answer or a real one. Just email us a detailed description of your problem to editorial@4wdaction.com.au and we'll enlist our panel of the top industry experts to answer your questions. It's advice you can trust, every single time, and it's a service we're offering free to you as a reader of 4WD Action.

CHIPPING THE TRITON

Hi guys,

I've been thinking about extracting some more power from my Triton but with all the different brands of performance chips out there I'm a little confused on what is the safest way in terms of reliability to get this power increase. Some chips say they alter the rail pressures, others say they only change injector timing and no doubt there are other ways I haven't read about yet. Are they all pretty safe? Or should I steer clear of a few. Can you help me make the best choice for my engines sake?

Regards,
Hayden Power

Hi Hayden,

Previously one would seek out a diesel expert with credibility to tune their diesel 4WD. Reason being; get just 'any old shop' to tune your diesel and it could be blown up in a jiffy. Yet when it comes to chipping, people seem to forget this and at times just buy 'any old chip'. The safest diesel tune starts with a diesel expert behind the tune on your chip. Not an online shop selling an



unknown brand that's for sure! Warranty and support is next because when something goes wrong you want to know it's a big enough company to support its warranty. How does it tune? Well we are not keen on injector duration control chips because of the extra load they put on injectors, so we stick with 'monitoring and altering' of fuel pressures just like the factory does.

Regards,
Andrew Leimroth - Berrima Diesel



OVERHEATING TROUBLES

Hi all I'm after some advice on an overheating issue with my GQ Patrol ute TD42. Just recently, anytime I go near 100km/h my temperature rises quite dramatically to almost overheating but is not losing any coolant. I have flushed the cooling system with a good quality flush, replaced the thermostat with a high flow unit, installed AU thermo's in case viscous fan wasn't working, and I've filled the cooling system with a good quality coolant. All of this has had no improvement on the issue. The old coolant looked clean and I did do a reverse flush on the radiator. I even replaced the radiator cap and I'm now at my wits-end with no more money to spend, so does anyone have any suggestions?

Cheers,
Martin Luscombe

Hi Martin,

It does sound like you have tried almost everything. Couple of other suggestions would be to look at your Viscus Hub. I know you have already replaced it but if it wasn't performing at its best, that may be one of the contributing factors. Electric fans are not always the best solution. Petrol AU falcons are normally fitted with 2core radiators and do not need as much air flow as your TD42 Nissan Patrol. So the AU fans might not be pulling enough air.

The hub, once hot basically locks up and starts pulling as much air as it can get through your radiator. Does your Nissan have a radiator shroud? You must have a shroud.

When you clean the radiator with a flush, was the water dirty, did any scale come out of the radiator? If so then it may have possibly blocked up some of your internal radiator cores which would be affecting the efficiency of the Nissan radiator.

If you have already tried my suggestions I would be to looking at the head gasket and or a cylinder head crack. I know that is something no one wants to hear but it is worth looking at it.

I hope I have given you some other inexpensive ideas.

Kindest Regards,

Justin Malaponte - NQ Crash & 4WD Spares

DUAL BATTERY ADVICE

Hi there 4WD Action,

In one of your recent magazines, with your dual battery setups, you mentioned having a triple battery setup with a lead acid and an AGM as auxiliaries.

I have been told mixed things about these things being together because of how they charge?

Also, do you think if I connect a CTEK D250S from my crank battery to a lead acid battery and an AGM in parallel, effectively giving me 200amp hours in total, would that work okay?

Cheers,
Cameron Winterbourne

Hi Cameron,

Ideally you would only use parallel batteries of the same chemistry and similar size e.g. 100Ah AGM with a 100Ah AGM and so on. This is because different chemistries have different charge rates and charge regimes. It is common practice that in a vehicle situation the auxiliary gets charged from the main battery through an isolator or VSR, you would most often see this setup under the bonnet. This is a parallel system and is quite acceptable but the AGM will only reach approximately 80% of full and in some newer vehicles getting about the isolators won't work at all. The triple battery setups that the guys run about with will be 3 of the same size, chemistry and age and in most cases will be charged via a DC-DC charger. The CTEK D250S is best suited for batteries between 100Ah and 400Ah in size. For most batteries the best charge rate is 10% of the battery's (or battery bank's) capacity so for a 100Ah battery a 10A charger is ideal, but some batteries such as AGMs can take 20 - 30% as their charge rate allowing for faster charging but best to check with you battery manufacturer.

Cheers,

Matt Porter - Aussie Batteries and Solar



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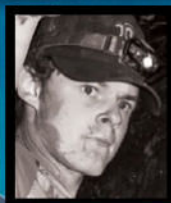
ULTIMATE TOURING HILUX



TOURING LUX

WITH A TWIST

WORDS BY JOCK McDONALD,
PHOTOGRAPHY BY ROB CAMERIERE



Whoever said you need to compromise between touring comfort & off-road ability hasn't seen a HiLux like this



The ultimate touring truck.
Practical and versatile

- Custom rear camping tray setup
- Four inch Monster Rides suspension lift
- Relocated rear shocks

Heavy duty diesel mechanic Trent Garth has owned a few Luxxies in the past, but he bought his current truck new after that model HiLux proved itself to him at work. "I have always had HiLuxes and work on them on minesites, writes Trent. "They last well on site and I reckon this one will last me forever. They are

also easy and simple to work on." Once Trent knew he had the right truck for the job, it was only a matter of time before he started setting her up the way he wanted. Affectionately named 'Smurfette' by Trent's missus Natasha, the end result is a truck that is not only practical as a ute should be, but also extremely capable and tough off-road. *4x4*

EXTERIOR

- Custom built rear tray setup
- Removable rear camping setup
- ARB bullbar with a Rockarmour 12,000lb winch
- Stauch Customs rock sliders and scrub bars
- ARB roof cage

It's one thing to have a practical ute, but it's another thing entirely to have a practical touring ute. Trent has setup his HiLux to be functional, yet simple. When Trent first picked up his blue Luxxy, he had a style-side tub and canopy setup on the back. "While the canopy and tub was excellent for safe storage, at the end of the day you are restricted with what you can put in it", explains Trent. "After a while I started doing more tough tracks and I was denting the sides of the tub. It would only have been a matter of time before I damaged the canopy."

To that end, Trent knew it was time for a tray. At first, he had his heart set on a steel canopy style camper to go onto a flat tray. He got onto Joe at Southern Cross Offroad about a tray setup and they got to work. The main tray is made out of two inch tubing and checkerplate steel.

"Above everything I wanted it to be versatile", writes Trent. "I wanted to be able to still get a load of wood or use the tray part in the back. Once we finished the tray, I was already leaning away from the canopy setup as it's a big heavy box on what isn't a massive truck, and I didn't want to overload it. At the time I was tossing up the canopy setup, Joe had a frame for one of his projects lying around that we test fitted to the back and by sheer coincidence it matched up pretty bang on. The end result was a stronger tray setup that weighed 200kg less than the factory tub and canopy."

One of the key rules Trent had for his Lux build up was to keep it simple yet functional. "The camp setup has the rooftop tent, spare wheel and jerry can holders all bolted together which is held down on the tray by four bolts." This enables Trent to completely remove the camp setup whenever he wants in a matter of minutes, and just run a tray. Making it perfect for what he wants to use it for. If you're a ute owner, take note. This is how you build the ultimate tray setup.

The rear spare, jerry cans and rooftop tent all come off together – in a matter of minutes



**THE ADDED FLEX
FROM THE RELOCATED
SHOCKS MAKES
A MASSIVE
DIFFERENCE**

Lifting a wheel like only
an IFS truck knows how



SUSPENSION, WHEELS AND TYRES

- Kuhmo K71 muddies
- 4.5in Monster Rides lift
- 4in Tough Dog leaves
- Relocated rear Monster Rides shocks

Because Trent's Lux is designed to be versatile, it was imperative that he got the suspension setup just right to suit a variety of uses. Up the front of Trent's truck is a 4.5in Monster Rides suspension lift, complete with adjustable upper control arms. Obviously, the Lux is an IFS truck, so lifting the front up too much can cause all sorts of problems with CV angles and front end damage. To counter this, Trent focused on two different areas. First he added a Monster Rides diff drop kit, and then he added a set of custom CV's to help keep drive to the front wheels. Up the back of the truck, Trent and Joe have relocated the rear shock mounts. "We worked together, and eventually got the setup right through trial and error", comments Trent. "We had to tweak the angle of the shocks a few times. As a result, the leaves run out of travel before the shocks do."

When Trent was first looking to upgrade his tyres, he had his eye on a set of sensible 33s. It didn't take long for Joe at Southern Cross Offroad to convince him otherwise, and now the Luxy is running a set of 305/70/R16 Kuhmo muddies. The combination of a four inch lift and big muddies makes this truck extremely capable. "The added flex in the rear end from the relocated shocks and the bigger rubber makes a massive difference in traction", explains Trent, "and means I can keep up with the bigger trucks on the tougher tracks."



The Luxy has no problem turning the big muddies thanks to the 3in exhaust and performance chip



ENGINE AND DRIVELINE

- 1KD-FTV four cylinder turbocharged diesel engine
- Three inch mandrel bent stainless steel exhaust
- Manta Sting performance chip
- Front ARB Air Locker

When it comes to the engine of the Luxy, Trent hasn't changed too much apart from a three inch Redback Exhaust and a Manta Sting performance chip. Having said that, because the tray setup on the back is lighter than the canopy and tub setup he had previously, it is safe to say the Lux has no trouble pulling away from a standstill.

Trent has tuned a few items in the driveline department of the HiLux, however. Up the front a set of custom CV joints have been added to help with the angles caused by the four inch lift.

"Originally I added a set of extended CV joints, writes Trent. I was getting a fair bit of steering shudder, so eventually I went with a custom set of CVs and the problem was fixed." Trent has also added an ARB air locker to the front end, as although the truck is running a big lift, she still likes to pick up the front every now and again. "The locker certainly helps keep up on the tougher tracks, laughs Trent, but I have had a few issues with the CV popping out at the diff end. We have pretty much replaced everything from new bushes to new diff bearings but I have still been having problems so we think there might be a problem with the diff or locker itself."

Because the rear of the truck articulates so well with the relocated shocks, Trent has not needed to add a rear locker to the Lux. That said, he reckons it's on the cards down the track, but he wants to sort out everything with the front end first.



The tidy engine bay holds Trent's dual battery system



The relocated rear shocks mean that the leaves run out of travel before the shocks do



INTERIOR

- Twin rear air outlets for ARB compressor hidden behind the seat
- GME TX3120s UHF
- Coin dispenser mounted to gearstick surround

Trent has left a lot of the interior of the Lux alone – and with good reason. HiLuxes boast a simple yet functional design from the factory, and knowing Toyota were onto a good thing, Trent has kept the interior pretty simple. It's not without a few tricks however, such as the ARB air compressor hidden behind the rear seat. "I put the compressor in the cab to keep it away from dust and mud, explains Trent. "I also added a dual air hose attachment to the compressor which runs to each door, so I can pump up both sides of tyres with ease." It's these little tricks throughout Trent's truck that really make it even more practical. Another neat DIY accessory Trent has added is the coin dispenser on the gearstick surround, so he can organise all the loose change that finds its way into the 4WD. Not a bad little trick if you ask us!

This ute is as functional as it can be, it even has a coin organiser!



The ARB compressor is hidden behind the seat with a hose attachment poking out either side, making air easy to access

Q: WHAT CHALLENGES HAVE YOU FACED WITH LIFTING YOUR HILUX, AND HOW DID YOU GET AROUND IT?

A: When we relocated the rear shocks, it was a bit of trial and error to get the measurements right as you can't just use a tape measure, move it and call it a day. We needed to mount the shocks a few times, and then make minor corrections to get it right.

Q: WHAT ADVICE WOULD YOU GIVE TO SOMEONE LOOKING TO BUILD A CUSTOM TRAY SETUP?

A: Definitely do your research, have a pretty good idea on what you want before you start throwing money at it. Don't be afraid to be different and budget for more than you first think.

THE TRAY WEIGHS 200KG LESS THAN THE FACTORY TUB AND CANOPY



The three inch exhaust and chip help the Lux put power to the ground



THANKS

"I would like to thank Joe and Kyle at Southern Cross off road, Jase at Staunch Customs, Mumfords Customs, my girlfriend Natasha Lavis for her patience and support, fellow Freedom 4x4 members and Jed Currey at Explore WA."

RUNDOWN

ENGINE: 1KD-FTV 4 cylinder factory turbocharged diesel

GEARBOX: 5-speed manual

4WD ACTIVATION: Part time 4WD with shift on the fly 4WD activation

SUSPENSION: 4.5in Monster Rides lift up front. 4in Tough Dog leaves with relocated 6in Monster Rides shocks in the rear.

WHEELS AND TYRES: 305/70/R16 Kumho K71 tyres, Dynamic steel rims



**UTE OWNERS
TAKE NOTE.
THIS IS HOW
TO BUILD A
SENSATIONAL
TRAY SETUP**

The rear of the Lux looks as good, if not better than the front

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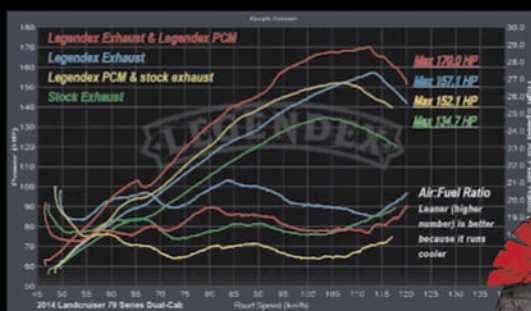
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COMPILED BY ALLEN HODGES AND BRENDAN SEYMOUR PHOTOGRAPHY BY DAVE WOLSCHENKO ➔

Whether it's performance, reliability or economy, we've got the answers to every single diesel upgrade question you've ever had, direct from the experts who install em and the 4WDers who've fitted em. Welcome to our massive Diesel Upgrades Edition!

The diesel aftermarket scene has never been stronger, and everywhere you turn there's a new company offering a high-tech solution to some of diesel's oldest questions. There's no doubting that diesel rules supreme when it comes to 4WD engines, but like the saying goes, you can always make a good thing better (we're pretty sure that's the saying, anyway).

Whether you've got an old diesel or a modern one, we all want three things – more power to deal with the effects of adding weighty off-road accessories, more economy so we're not at the

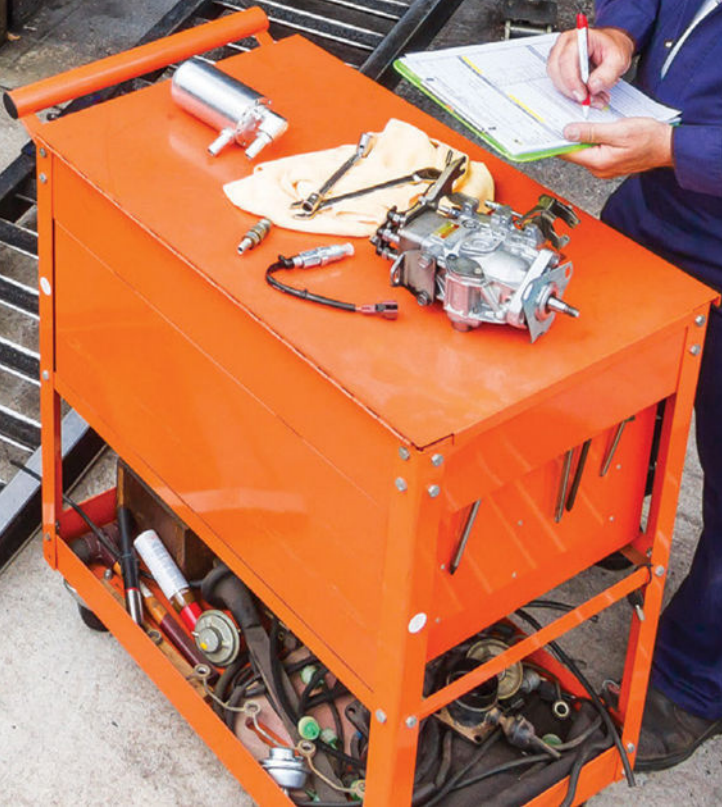
fuel pumps as often, and more reliability so we've got the confidence to head off-road and know we're driving home again under our own steam.

Over the past 12 months we've been methodically testing the most popular diesel modifications and upgrades on the market. Combined, we've got over 100,000km of real-world testing carried out across eight different vehicles. In the following pages, you'll find the results of our tests, plus info direct from the experts who install each modification and the owners who run em. Welcome to the results of Australia's most comprehensive diesel upgrades test!

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GET YOUR DIESEL

RUNNING RIGHT!

Before you start chasing big power, these six essential modifications will add massive amounts of reliability to your diesel

↓ FUEL FILTER

Nothing kills diesels quicker than poor fuel. Here's how to guard against it

FROM THE EXPERTS:

"A secondary fuel filter gives you an extra line of protection from contamination in your fuel system," says Gavin Bradford from Diesel Care, makers of the Diesel Care Fuel Manager filter kits. "We sell two options – a 30 micron primary filter assembly, and either a two or five micron secondary filter. The secondary filter is the same or lower than a factory micron count. A glass bowl on the filter simply allows you to see if there are any contaminants or water in your fuel system. An additional warning buzzer or light can be added into the circuit for the filter, or another option could be to wire your new assembly into your existing water-in-fuel dash light.

"We like to add our filters to 4WDs as a secondary setup, but there's no right or wrong position to fit them. The main thing to look for in a kit is that everything is included – including the vehicle-specific bracket, and availability of specific filters. If the fuel filter is used for a common-rail application there will be no restriction to the fuel supply, unless the wrong filter is used which can cause a restriction, so it's vitally important you buy the right filter for your 4WD."

REAL-WORLD REVIEW:

"I run an aftermarket fuel filter on my turbo-diesel 80," says our Cape York correspondent and DVD presenter Ray Clark. "It has a glass bowl on the bottom so I can see if there is any water, with the usual drain on the bottom. I've had to drain the thing at least ten times. It has a big inlet and outlet so it doesn't affect fuel supply, bolts on in minutes to the factory bracket and I change it every 10,000km – or if I pick up a bad batch of fuel."

PRICE RANGE: \$270 - \$400 for a complete kit

POWER UPGRADE:

ECONOMY UPGRADE:

RELIABILITY UPGRADE:

YOU WANT THIS MOD IF: You like the fact that your pump and injectors are in good nick.

↓ FUEL ADDITIVES

Power and reliability in a bottle – but is it too good to be true?

FROM THE EXPERTS:

"The most common diesel additives function is to clean gums and varnishes from fuel lines and injectors," says Steve Marriott from Fuel Doctors. "The majority of additives are kerosene-based. Cleaning a contaminated fuel system will restore lost power, but it won't increase power on its own. The question of how often you should run a fuel additive comes down to your budget, and how pedantic you are about fuel quality and preventative maintenance. I wouldn't fill up anywhere without adding my preferred additive. Kerosene-based additives are chemically abrasive to fuel pumps and injectors – detergent-based additives are the way to go in common-rail systems."

FROM THE EXPERTS:

"Most additives disperse small amounts of water, and generally contain algaecides to kill diesel bugs," says Andrew Leimroth from Berrima Diesel. "There's no free lunches when it comes to diesels – fuel additives won't increase power. I usually recommend only using them if water and algae were found in the fuel. Sometimes too much is a bad thing – so don't over-dose your engine on diesel fuel additives."

REAL-WORLD REVIEW:

We found that the additives we've used haven't increase engine power, but they have restored lost power. Like most 4WDers, we want the most out of our diesels, especially because we've got half a dozen in the shed that go into the most remote parts of the country. We've taken to adding fuel additives into the tank every couple of months – the last time we had the tank on Project GU out and drained, it was perfectly clear to the last drop – good enough for us.

PRICE RANGE: Starting from \$15.

POWER UPGRADE:

ECONOMY UPGRADE:

RELIABILITY UPGRADE:

YOU WANT THIS MOD IF: You want to make a commitment to keeping your diesel in good nick for as long as possible



OIL CATCH CAN

They're not just for big-power diesels. Here's why you need an oil catch can right now

FROM THE EXPERTS:

"A catch can catches excess oil vapour from the engine's crank case ventilation system, separating the majority of the oil while allowing the gasses to pass through the catch can unrestricted," says David Mitchell from High Performance Diesel. "How often you need to empty it is determined by how much oil vapour a particular engine pumps out of the crank case ventilation system. It is a good idea to check a newly installed catch can frequently until you learn how often it will require emptying.

If the catch can is overfull the oil will continue into the air intake and eventually be consumed by the engine. It can also cause a restriction in the ventilation system causing the crank case to pressurize, which leads to oil leaks from seals and gaskets on the engine or oil to leak past the seals in the turbo charger.

It is highly recommended that all turbo charged diesel engines have a catch can fitted especially all late model engines with exhaust gas recirculation systems. A good catch can should have some form of filter inside to condense the oil vapour back into a liquid."

REAL-WORLD REVIEW:

"I fitted a catch can to my 1KZ-TE HiLux about six months ago, and I'd highly recommend it to anyone with a diesel," says our Travel Editor Jack. "They're a piece of cake to fit – mine used factory threaded holes in the engine bay – don't cost an arm and a leg and go a long way in helping your oiler do its thing. You only need to check them once every couple of weeks or so – and empty it even less often. Some of them even come with a dipstick. If you've got a diesel, especially one with an EGR valve it should be one of the first things on your list.

PRICE RANGE: \$100-\$400

POWER UPGRADE: ★★★★★

ECONOMY UPGRADE: ★★★★★

RELIABILITY UPGRADE: ★★★★★

YOU WANT THIS MOD IF: You've got a turbo-diesel, if your engine 'breathes' heavy (puffs out oil vapour) when you take the oil cap off or if you're pumping extra power through it in the way of upgrades.

AIR FILTER

An air filter is your engine's only defence against dust – so it pays to get it right

FROM THE EXPERTS:

"It's under the bonnet, and so most people forget about their air cleaner!" says Ben Lavis from Drivetech 4x4. "It protects the heart of your vehicle, and shouldn't be ignored. If you're heading off on a trip, keep a spare filter on board and replace as necessary. Looking after your air filter correctly will ensure better fuel economy, and extend the life of your engine. I'd recommend you inspect your air filter every 5,000km at a minimum.

"Weather also makes a big difference – if you're travelling in the wet season in the Top End, I've seen filters clog up like blocks of cement in hours. I stick to OEM-style paper filters and don't bother trying to clean them – I just replace them. If you try to clean your air filter, like blowing air into it, or knocking the dust out, you may cause slight damage to the element or the seal that could allow damaging dust into your engine. A visual inspection is best – but if it's really blocked, you may start to experience increased fuel consumption, lack of power or even difficulty in starting the engine. Look for a brand that meets or exceeds OEM standards. Filtration is not a part that a 4WDer should try and save a few bucks on."

REAL-WORLD REVIEW:

We've been running Drivetech 4x4 filters on Project GU over the last 18 months since the rebuild, and the difference between Drivetech 4x4 air filters and the cheapie ones (which actually aren't that much cheaper) is staggering. The proof's in the pudding – the filters seal perfectly within the airbox and don't let any dust through, meaning the intake stays perfectly clean. They're affordable enough to keep a spare on board and swap it out after a couple of dusty days of driving. It's a big thumbs up from us.

PRICE RANGE: Drivetech 4x4's filter kits include a fuel filter, oil filter and air filter, and retail from \$45.

POWER UPGRADE: ★★★★★

ECONOMY UPGRADE: ★★★★★

RELIABILITY UPGRADE: ★★★★★

YOU WANT THIS MOD IF: You don't like the idea of a \$10,000+ engine rebuild. Seriously, it's the cheapest insurance you'll ever take out for your 4WD.



↓ TURBO TIMER

The ultimate in fit-and-forget reliability – here's why you need a turbo timer.

FROM THE EXPERTS:

"A turbo timer is a device used to let the turbo cool down, but still allow the driver to get out and lock up the vehicle and walk away," writes Allen Hodges, 4WD Action tech journo and twenty-year diesel engine specialist. "There's no real need to use a turbo timer when running around town, as the EGTs don't get high enough to warrant an extended cool down period. It's when you're out on the highway, pushing hard for a couple of hours before pulling into a servo for fuel or lunch that you really need one. Both older mechanical pump 4WDs, and those with factory or aftermarket turbos would benefit from a turbo timer. Factory-spec common-rail diesels don't need a turbo timer as the EGT's don't get as hot as those in a mechanical pump engine, but chipped or otherwise modified common-rail 4WDs will definitely benefit from one. Just remember to check legalities with the relevant road and traffic authorities in your state prior to fitment."

REAL-WORLD REVIEW:

"Value for money, a turbo timer is a great bit of kit for your turbo diesel which can be installed in under 5 minutes by even beginner DIY mechanics," says Shaun. "I usually set mine on a minute and use it after long stints on the freeway. The best thing about a turbo timer is that it will remember to let your turbo cool down after a long drive when you don't, cheap insurance if you ask me! Just a reminder, if you're a Toyota driver just make sure you aren't relying on your handbrake when you leave your 4WD idling on your turbo timer."

PRICE RANGE: \$100 - \$250

POWER UPGRADE: ★★★★★

ECONOMY UPGRADE: ★★★★★

RELIABILITY UPGRADE: ★★★★★

YOU WANT THIS MOD IF: The idea of sitting in your 4WD letting it cool down for five minutes after every hot run doesn't sound like fun



↓ BOOST AND EGT GAUGES

Know what your motor's doing at any time with these essential upgrades

FROM THE EXPERTS:

"A boost gauge reads the relative pressure acting on its sensor usually as a PSI or KPA reading," explains Andrew Leimroth from Berrima Diesel. "It should be plumbed in as close to the inlet manifold as possible. This placement means it will be reading as close to the boost available as possible. Like all gauges, though, you need to know how to read it. The general rule of thumb is for non-intercooler models, 10-12psi is acceptable, and for intercooled 4WDs, 13psi+ - but this is dependent on the motor and turbo setup."

"An EGT gauge reads heat temperatures up to about 800°C via a probe fitted in the exhaust. General perceptions of EGTs have been wrong for quite some time. What once was thought to be exceptionally high is now a norm for modern common-rail diesels. Peak EGT is the time the gauge virtually settles and stops increasing. Peak EGT can be usually around 600°C to 750°C in most modern diesels, or closer to 550°C in an older diesel. The most common misconception about these gauges is that they will save your engine. They can only do this if you know and understand acceptable peak EGTs and boost levels."

REAL-WORLD REVIEW:

"The boost and EGT gauges I've installed have made a bigger difference to my driving style than the aftermarket turbo they monitor," says 4WD Action's Matt Smith. "The turbo has shown just how easy it is to let EGTs creep up on you. I've found the biggest threats to cooking the engine aren't super steep highway hills that command a drop back to third gear. They're the long, gradual inclines that don't force you to drop down a gear, but mean you've got to put the right foot down just a little bit more than normal - often without realising it."

"The warning alarm that I've pre-set on my EGT gauge for 450°C often snaps me out of my daydream of deserted campsites when I'm on these hills, and allows me to catch them rising way before they can do any damage. I then back right off and make a point of keeping the EGTs under 450°C, because on an engine approaching half a million kays, using a little less right boot is the single easiest thing you can do to ensuring it's reliability."

PRICE RANGE: Boost gauge: from \$250 to \$500 generally for kits. EGT gauge: from \$400 upwards.

POWER UPGRADE: ★★★★★

ECONOMY UPGRADE: ★★★★★

RELIABILITY UPGRADE: ★★★★★

YOU WANT THIS MOD IF: You want to keep an eye on your engine at all times behind the wheel





INJECTORS

There's no point chasing more power if your fuel system's not spot on

FROM THE EXPERTS:

"Generally, if your engine is knocking, blowing smoke, or using more fuel (and obvious issues such as air filters, dirty MAFs and so on have been sorted already) then it's likely that your injectors are on the way out and need replacing," explains Matt Bailey from Baileys Diesel Group. "It's a great excuse to upgrade your rig, too. You can absolutely get more power from rebuilding injectors. You can use a Stage 1 injector on a factory ECU, however the air-fuel ratios will be richer (similar to running a chip). But for Stage 2 or Stage 3 injectors, you'll definitely need a high end chip or remap that will allow rail, boost and duration manipulation at a minimum. Injector servicing is not really an option anymore with common rail injectors. They either need to be completely re-manufactured or replaced. The massive injection pressure has significant wear across so many components, that a simple quick service is not really viable as so many parts need replacing. The big misconception is that all these common-rail engine failures are due to the injectors. We regularly make +20, +40, and even up to +70% injectors without issues, however, daily we see injectors be blamed for engine failures when their flow rates are all within specification. Logic would dictate that if the injectors really were to blame than these higher flowing units surely would fail, however never do."

FROM THE EXPERTS:

"Rebuilding injectors will bring them back to manufacturers specs when done at an authorised shop using genuine parts and tested on a OE test bench e.g. BOSCH 708," says Cornell Fuel Injection's Anthony Grech. "This will then create optimum combustion in engine which will then

give you optimum power and performance. This will also set injectors to correct emission standards. There are many types and brands of injectors in the market place; mechanical (single spring), Mechanical (twin spring) and common-rail injectors being the most common. Twin spring injectors have two stage pressure setting and common-rail injectors operate at extremely high pressures of up to 30,000 psi."

REAL-WORLD REVIEW:

"The major benefit I found when having the injectors replaced in my D-4D HiLux was reliability," says Travis Annabell, editor of our sister publications Camper Trailer Touring and Overlander. "Fuel economy and power didn't seem to change, but the fact was I was having all sorts of dramas with the engine – horrible injector rattle when cold, plumes of smoke upon start up if I'd parked on a slight downward slope. I reckon if I'd waited much longer to get the injectors replaced, then the engine would have been destroyed. When it comes down to it, it was a choice of \$3,000 to do the injectors now, or \$15,000 to do the engine down the track plus a set of \$3000 injectors ... it's not really a choice in the long run. I'd recommend without hesitation that if you're common-rail diesel has a cold start rattle, then get it to a diesel expert ASAP – it could save you thousands!"

PRICE RANGE: From \$600 for reconditioning of four-cylinder mechanically-injected diesel to \$5000+ for replacement of late-model V8 common-rail injectors.

POWER UPGRADE:

★★★★★

ECONOMY UPGRADE:

★★★★★

RELIABILITY UPGRADE:

★★★★★

YOU WANT THIS MOD IF: You want to make sure your fuel system is in perfect condition

BEST-EVER

DIESEL PERFORMANCE UPGRADES!

Forget being stuck in the slow-lane.
Here's how to make your diesel sing!

↓ TURBO KITS

They're the best thing to happen to diesel engines since the injector pump. Here's what you need to know before you add a turbo to your 4WD

FROM THE EXPERTS:

"Most turbo systems are designed to be DIY but need a final check and adjust by a dyno or diesel expert," says Paul Taylor from Denco Diesel. "Basic mechanical knowledge and tools are required to fit at home. Some turbo systems or vehicle models require basic welding for exhaust systems and/or brackets which could be outsourced if you don't have the tools yourself. Most turbo kits are designed to achieve a power gain of 30-35% after being tuned. Custom applications can produce more power and require additional modifications.

Professional dyno tuning will ensure that the power output under maximum load is not exceeded which can place excessive stress on the engine. A dyno before and after would be recommended to ensure the power achieved is within the turbo kit manufacturers guidelines.

Most naturally aspirated motor can handle a turbo however it should be correctly matched to the size of the engine. Mild power and boost increases will ensure long and reliable engine life. An engine in good condition is never too old to turbocharge. Before fitting to a vehicle of any age you should ensure it has good compression, no oil consumption and no knock or unexplained rattles.

Having the engine condition checked by an expert will determine if it can be successfully turbocharged. A dyno test before fitment will determine whether the recommended power gains have been achieved."

REAL-WORLD REVIEW:

"When we first bought Project GU almost a decade ago now, the old girl was non-turbo'd and as slow as a wet week," says Brenno. "We've been running a turbo on the truck now for almost 250,000km and she's still going strong. There's nothing like that feeling of boosted performance when you put your foot down. You don't need to 'wind up' the vehicle to over-take anymore!"

PRICE RANGE: \$2500-\$4000

POWER UPGRADE:

★★★★★

ECONOMY UPGRADE:

★★★★★

RELIABILITY UPGRADE:

★★★★★

YOU WANT THIS MOD IF: You're looking for a no-hassles, decent-but-not-outrageous, power increase from your non-turbo diesel

↓ EXHAUSTS

There's no use putting more fuel and air in if you can't get it out the other side of the motor!

FROM THE EXPERTS:

"An exhaust gives big returns and should be one of the first mods you fit to your diesel," says Barney Lewis from Genie Performance Exhausts. "A quality aftermarket exhaust will deliver significantly more power and torque in the everyday driving and towing range, cooler operating temperatures, longer engine life and great sound. Better performance comes from a design with the right flow dynamics – which is more than just tube size. Sudden changes in tube size create turbulence and inhibit flow.

"Most of our systems are 3in but on smaller displacement engines which may only have a 2in turbo outlet we graduate up from 2.5in to 3in and we position our high flow cat where it creates enough back pressure to eliminate over-spooling which can happen if you go too large too quickly.

A no-muffler system versus a system with a straight-through muffler, will have minimal to zero effect on performance. The only difference is sound and sometimes off-road clearances. A stock muffler is quiet but very restrictive because of the convoluted internals. Towing is not recommended without a muffler as the load can create a drone which gets pretty ordinary on a long trip."

"Your exhaust is exposed to the elements, continual heat cycling (cold-hot-cold) and constant vibrations and jarring. So the quality of materials and construction are critical. The exhaust manufacturer's warranty will give you a good idea about how long they think it will last. Mandrel-bent not press bent makes big flow differences. Gradual internal changes not sudden, stepped changes in tube diameter which create turbulence."

"409 grade stainless was developed specifically for exhausts. It's what Toyota and the other major manufacturers use. Higher grades like 304 look shiny and pretty but get brittle from constant heat cycling. It's true that 304 may resist rust longer than 409, but the 304 will probably break before 409 grade rusts. Mild steel and aluminised mild steel exhausts only come with short warranties (approx 2 years or less) for good reason."

REAL-WORLD REVIEW:

"After installing an aftermarket exhaust on the 79 I did notice that the turbo spools up slightly faster than before and seems to be a little more torquey when poking around town," says Shauno. I run a very small muffler on mine and with the crossover pipe, the thong-slapping noise is gone and sounds tough in my opinion and best of all doesn't drone on the highway."

PRICE RANGE: From \$600 for mild-steel pipe-only systems to \$1600 for full stainless steel systems.

POWER UPGRADE:

★★★★★

ECONOMY UPGRADE:

★★★★★

RELIABILITY UPGRADE:

★★★★★

YOU WANT THIS MOD IF: You're chasing a bit more power, better economy and a tough exhaust note



TURBO UPGRADES

It's the big new thing in the diesel scene. Wait til you see what what can be done with a turbo these days!

FROM THE EXPERTS:

"The advantage of a bigger-than-factory turbo is it is capable of more air flow and improved performance as long as the vehicle has the other supporting modifications," explains Tony Martin from MTQ Engine Systems. "The turbocharger is as reliable as long as it is tuned to within the operating specifications of the upgraded turbocharger it is important to ensure you are buying a quality brand upgraded turbocharger and not inferior copy product. Bolting on a bigger turbo will require retuning of the vehicle to suit, depending on the supporting modifications you may not get the gains out of the turbo that you were expecting. The whole system needs to be tuned and matched to ensure you get the best performance possible."

"A larger turbo normally causes more lag. As the wheels in the turbocharger are bigger they require more energy to get them to turn. Depending on how big you go with the turbocharger you can get around some of this in the tuning process. Regarding the boost, a larger turbo does not make more boost unless you tune it that way. The advantage of a bigger turbo is you have increased air flow

to the engine. With the increase in air flow it is normally cooler as the turbo does not have to compress the air as much to make the same volume of air. Cooler air makes more power."

REAL-WORLD REVIEW:

"We recently did the turbo upgrade on Project GU, and fitted a custom MTQ TD05 turbo with an 18g wheel and .6 rear housing," says 4WD Action tech journo Allen Hodges. "The power delivery both on road and in the bush is awesome – you can sit in fifth gear on the freeway doing 100km/h, and if you need to overtake you can. Yet on the other hand you can lock it 4-Lo and have enough power to punch up the biggest hill or through the boggiest puddle, it just spools up and pulls it way through with great ease. The turbo combined with the required fuel pump modifications and tune make for a very usable combination and gave it nearly double the horsepower and torque that it had."

PRICE RANGE: \$1000 upwards depending on if you can do the removal and installation yourself.

POWER UPGRADE:

★★★★★

ECONOMY UPGRADE:

★★★☆☆

RELIABILITY UPGRADE:

★★★☆☆

YOU WANT THIS MOD IF: You want big power and love the sound of a diesel on boost

AIRBOXES AND BIG SNORKELS

It ain't just off-road bling – there's a real science behind big snorkels and airboxes

FROM THE EXPERTS:

"The advantage of running a larger snorkel is increased air flow for your larger diesel engines which commonly struggle to get enough air volume through the standard/snorkel set up," says Rob Paterson from Raslarr Engineering. "Most of the time they will bolt the same way as a conventional snorkel and in most cases, like the GU Patrol or LandCruiser, it will cover the original hole. They come into their own on a large modified diesel that needs every bit of air volume available to run cool. The benefit of a rear facing head is that you are not ramming dirt, dust, leaves and water into the air cleaner. We have also found that the forward facing snorkels don't make a performance gain with the positive pressure of facing forward as the engine has more than enough intake vacuum."

FROM THE EXPERTS:

"Running a high-flow airbox means that you have more air available to the engine which you need to increase horsepower and in turn make the engine run cooler," says Mill Baltas from Milleld Engineering. "Most aftermarket airboxes will run an aftermarket air filter – this is simply because they flow more than the standard filter. A standard family 4WD will benefit from an airbox upgrade as much as a comp truck. Keep in mind with some aftermarket air boxes you will need to relocate components around in the engine bay to make them fit."

REAL-WORLD REVIEW:

"In my case, running 30psi the big airbox and snorkel helped a tonne," says our Cape York correspondent Ray Clark. "I originally modified my airbox to 4inch inlet and a 4inch stainless snorkel, and that helped a little, but it was still restrictive above 23psi. I then fitted a Moonlight Fabrications airbox which runs a Duramax panel filter, it draws through the bottom of the box and then up through the filter so you have a bit of breathing space if water does get in there. I noticed a bit of a difference in fuel economy, but even on a stock motor it should help a small amount – the less the turbo has to work to drag air in, the more efficiently it will run. One way I can prove this, is my EGTs did drop around 50°C due to the increase in airflow."

PRICE RANGE: \$550+fitting and upwards for a snorkel, \$600+fitting and upwards for an airbox

POWER UPGRADE:

★★★★

ECONOMY UPGRADE:

★★★★

RELIABILITY UPGRADE:

★★★★

YOU WANT THIS MOD IF: You're looking for any potential power in your diesel, and you like a bit of bling



TUNING

Forget what anyone tells you – seat-of-the-pants tweaking will never match professional tuning

FROM THE EXPERTS:

"Diesel tuning is crucial to keep your engine in its best power-for-economy state," says Andrew Leimroth from Berrima Diesel. "Firstly, a good diesel tuner can tune with or without a dyno. There aren't really that many experienced diesel experts around so dyno tuning can allow an inexperienced tuner to tune correctly. Whilst it's commonly thought that a diesel needs re-tuning after an exhaust upgrade it's more common to re-tune with larger mods such as bigger turbos and intercoolers. Diesels are very simple and reliable so it's probably not worth trying to tune it yourself for fear of upsetting an already okay-running engine. The advent of EFI systems means they are always in-tune. That said I advise about every 50,000km to 100,000km a list of checks, resets and sensors tests and cleans be performed. Diesels are very reliable and can run sweeter after a tune but a tune cannot fix mechanical problems within the engine."

REAL-WORLD REVIEW:

"Value for money, I don't think there is anything better for your diesel engine than a good tune," says Shauno. "The key is to find somebody who is not only a diesel expert (and there's only about a dozen in Australia I would trust) and who knows your particular engine. I recently got the Dirty 30 tuned and came away with more power, less smoke and better fuel economy – that's a massive win in my books! Plus you then have the confidence that you're oil burner will be running a lot better and keep you moving of many more years to come."

PRICE RANGE: Old school mechanical injection systems usually run out to around \$1500 for injectors, tappets and pump settings. On modern EFI controlled Diesels \$500 and upwards, but with some parts/sensors alone being \$300+ this can climb.

POWER UPGRADE:

★★★★

ECONOMY UPGRADE:

★★★★

RELIABILITY UPGRADE:

★★★★

YOU WANT THIS MOD IF: You're not sure of your engine's state of tune, or you've just added new mods





Turbos are great, but here's how to effectively deal with the excess heat they produce

FROM THE EXPERTS:

"An Intercooler cools compressed air coming from the turbo," says Matthew Gray from High Performance Diesel. "When the air is compressed by the turbo it naturally heats up and by cooling it we can deliver a denser and more oxygen rich mixture to the engine which makes the engine perform more efficiently. This most noticeably equates to more power and torque. Front mounted coolers offer the best exposure to cool air under driving conditions and properly designed front mount kits offer no compromise in throttle response whilst delivering unrivalled performance. There are cleverly engineered front mount kits on the market that are winch and bull bar friendly that make use of the huge frontal area of the car. Top mount coolers can perform well with smart thermal switched fan operation and the key here is to get the largest core size to dissipate the heat, some kits come with larger bonnet scoops to facilitate this. Top mounts can suffer from high under bonnet temperatures."

"Core type plays a big part in cooling. Most factory coolers are tube and fin design which has been around for a long time. There are many kits on the market to replace failed tube and fin factory coolers that are a slightly larger version of the same factory technology and we would advise people to upgrade further to a bar and plate core that we believe delivers better heat dissipation through better technology if they are planning to seek out the best performance for their vehicle. Bar and plate cores have internal louvres that have up to twice the surface area of tube and fin. Quality bar and plate coolers also allow you to specify the fin pitch, tube height and louvre style incorporated into the cooler that is specific to the application. This isn't available with extruded tube and fin cores."

FROM THE EXPERTS:

"Top mount versus front mount is a discussion we have every day," says Craig Maxwell from Cross Country 4x4. "The disadvantages of a front mount is it is battling for air, it has to compete with a bullbar, winch, driving lights, LED light bars, the grill and actual room to fit. The heat removed from the intercooler will now increase the thermal load on the cooling system. Also, at low speed and low RPM there is very little air flowing over the intercooler. Another factor to consider is how far the compressed air from the turbo has to travel to enter

the intake manifold, sometimes up to 5m worth of pipework. The top mount intercooler does not have any of these issues providing there is a good quality fan on the underside of the intercooler. TMICs offer much better throttle response and far better cooling characteristics. The down side is the hole in your shiny bonnet but when you look at air flow, air temperature, distance the air has to travel it is an easy obstacle to overcome."

"The main thing that removes the heat in your intercooler is the core (the radiator looking bit). There are two main types, 'bar and plate' and 'tube and fin'. A bar and plate is the cheaper of the two and easier to obtain, as the name suggests it is a heavier core that retains heat for much longer. The tube and fin core is a performance core, you will see very similar construction for cooling in Formula One cars. In our opinion the tube and fin is far more efficient and has an outstanding ability to cool and be more consistent in cooling for longer. Also, just like buying your 4WD, you want good quality and reliability. No one likes spending good money only to find out that what they bought is inferior and fails prematurely. A good intercooler will be backed by the supplier and offer substantial warranties in the event of a manufacturing fault."

REAL-WORLD REVIEW:

FROM GRAHAM

"When it came time to address my skyrocketing EGT figures, a new intercooler was actually not my first concern," says Graham about his big GU touring ute. "Rather I opted for a more efficient turbo plus overhauled fuel pump and of course a quality tune by those who know more than how to twist a screw all the way out! This alone made a world of difference. When a mate offered me a brand new GU top mount cooler for free, I figured that'll do for now. It's still there today, 2 years on. My EGTs have been reduced on average by 100 degrees across the board. Where before I'd cruise in the high 300's to low 400's now I sit on 315 at 110kmph. Even on the longest steepest hills I've not seen figures above 450°C. Keep it simple but do it right"

PRICE RANGE: \$600 to \$3000

POWER UPGRADE:



ECONOMY UPGRADE:



RELIABILITY UPGRADE:



YOU WANT THIS MOD IF: You're looking to decrease your EGTs and get more out of your turbo-diesel





BEST-EVER

BANG-FOR-BUCK COMMON-RAIL MOD!

Diesel chips are the ultimate in plug-and-play performance, but what do you need to know before you buy one?

FROM THE EXPERTS:

"Piggyback plug-and-play diesel chips work by altering the info from engine sensors going to the engine's ECU (computer) so the ECU makes controlled tuning changes," says Andrew from Berrima Diesel. "Injector control chips directly add voltage to the injectors. Simply put, a diesel chip adds more fuel to make more power. That's how tuning a diesel has always worked. It can be done crudely or efficiently. It can be done by altering the fuel pressure or by holding an injector open longer. There are many ways to add fuel to the equation. Anytime can be a good time to add a tuning chip to a common-rail diesel, and sustainable gains of 10-15% at the wheels is the average power increase. As long as the engine is computer controlled it needs a chip to be tuned."

"There are many ways to add fuel to the equation. Each way has an advantage or disadvantage at some point. ECU flashing/remapping can give good to very high power gains but the safety of these gains can be questionable as the new engine tune map (brain) doesn't recognise the higher tune if it is too high/unsafe. Piggyback/plug and play systems give the safest power gains but gains are limited by the original computer safety systems. Injector duration control chips can give good to very high power gains but are gains made directly at the injectors, in turn bypassing the engine's computer safety systems."

FROM THE EXPERTS:

"Some chips are set up to change injector duration and some are setup to have more pressure," says Gavin Bradford from Steinbauer Performance. "The advantage of modifying injection duration is that we have found chips that run higher pressure will wear injector nozzles quicker. There is no real problem with fitting a chip to a new

vehicle but we suggest driving the vehicle for a couple of thousand kilometres first so you know you can feel the difference that the chip makes. As long as the vehicle is mechanically sound there is no issue with fitting a chip to an older vehicle. The normal gains we find on most vehicles is between 20-40%, but not all vehicles will handle 40%. Your 4WD doesn't have to be common-rail injection, as long as the fuel system is electronically control it can have a chip fitted to it."

REAL-WORLD REVIEW:

"One of the newest vehicles in the 4WD Action shed is a 2013 ZD30 GU Patrol," says Brenno. "It's a good honest truck, but anyone who owns a ZD30 knows they aren't exactly powerhouses. We've been running a DP Chip on it for about 12 months now. Last year I took it out to the Simmo to test some new tyres, and had the big girl fully loaded. Out of interest I disconnected the chip to see what sort of difference it did make, because it's easy to forget, and get used to whatever power is available. The difference? Chalk and cheese doesn't even begin to describe it. With the chip unplugged the fully-loaded and aired-down vehicle felt like it had about as much power as an early 80s HiLux. With the chip plugged back in it drove like the modern, economical, powerful vehicle it should have been from day dot. Fuel economy was about the same with and without the chip - I'll admit to using the extra power that was available to be able to sit up on the speed limit. There's no way I'd ever go back."

PRICE RANGE: From \$1500 to \$3000 depending on type of chip and size of engine.

POWER UPGRADE:

ECONOMY UPGRADE:

RELIABILITY UPGRADE:

YOU WANT THIS MOD IF: You're after simple, safe, reliable power out of your common-rail diesel.



BEST-EVER

OLD-SCHOOL DIESEL PERFORMANCE MOD!

If you're looking for serious power from your mechanical diesel, you can't look past your injector pump's hidden potential

FROM THE EXPERTS:

"There's a lot of power that can be found in your injector pump," says Tony Martin from MTQ Engine Systems. "When you upgrade an injector pump, the workshop changes the plungers and other various internals in the injector pump. There is also a lot of internal calibrations that take place as well. Not all upgraded injector pumps are the same. Make sure you get one from a quality repairer who is experienced in the repair and modification of the injector pump system. It is not as simple as bolting in bigger parts into the injector pump. Rebuild cost vary depending on the vehicle a pump overhaul can cost anywhere from \$1000 upwards to about \$2500 just for the pump not including the removal and refitting. Running a bigger injector pump is only beneficial if you have bigger turbos, intercooler and other supporting modifications.

It depends on your budget but it is best to do it right the first time – it will save you in the long run. If you go with a big injector pump and you don't have the supporting modifications you will get too much fuel and have excessive smoke. Bigger injector pumps are mostly sold as a performance upgrade. They are not designed for optimum fuel economy although some still achieve reasonable figures.

The most common misconception is that all pumps are overhauled the same. There are 100s of thousands of dollars in test and calibration equipment and years of training to ensure your injector pump is set up correctly and is performing as per the OEM specifications. Not every person who repairs injector pumps has this at their disposal. The other side is to ensure that common electronic parts that fail are replaced during the overhaul process. ZD30 injector pumps have a circuit board built into the pump which should be replaced every time they are repaired. This adds cost to the overhaul but adds reliability to the build. Not everyone replaces these sorts of parts and if it fails prematurely you can be out of pocket for the removal and refitting (which can be over \$1000) of the pump again plus depending on the service you get from the repairer you may be up for the cost of this as well."

FROM THE EXPERTS:

"You can rebuild common-rail pumps," says Anthony Grech from Cornell Fuel Injection. "The cost is approx. \$700.00 to \$1500.00. They are only a supply pump which develops high pressure and fuel supply to the rail. We do not recommend running second hand pumps, as it can be difficult at times to judge condition and calibration. Also if problems occurs after installation this will mean technician/mechanic will need to remove and refit pump twice. This can be very time consuming and costly. The pump can be also faulty and you can start looking elsewhere for the problem when the pump is still faulty. There's no advantage to running a bigger pump for common rail systems."

REAL-WORLD REVIEW:

"I was looking for more power from my aftermarket turbo'd TD42," says 4WD Action Editor at Large Steve Collins. "I needed to recondition my old leaky injector pump and the difference in price between rebuilding my 10mm pump and 12mm pump was only a few hundred bucks so it was a bit of a no brainer.

The only real down side is that you can't just dump a heap of extra fuel in without also increasing air flow. I high-flowed my TD05 turbo to suit, upped the boost pressures to 18psi, swapped out the injectors and got the whole package tuned on the dyno.

Power rose 235%, from 64kW to 151kW at the treads. The increase in torque was about the same. Aside from a puff of smoke on cold start-up that wasn't there beforehand, it runs and drives like standard albeit with a bucket-load more grunt. I've clocked up 40,000km including trips to the VIC High Country, Cape York, Fraser and the Flinders and I've not had one issue with it. It's been as reliable as any standard setup.

The million dollar question is - does it get hot? Truth is, it can get warm if you're into it for too long up hills but if you drive with common sense you'll never have a problem. Here's the thing... Heat is a result of power. Any motor that's making two to three times more power than it was ever designed for (remembering it was a factory non turbo) is going to get hot to some degree. How hot it gets is ultimately determined by the tune, your cooling system and how it's driven.

With the right tune, a responsible right foot and routine maintenance, there's no reason it won't be as reliable as any 4WD in the bush."

PRICE RANGE: The cost of a standard overhaul compared to an upgraded system varies depending on what injector pump you have. On top of a standard overhaul you would expect to add somewhere between \$500 to \$1000 depending on your injector pump

POWER UPGRADE:

★★★★★

ECONOMY UPGRADE:

★★★★★

RELIABILITY UPGRADE:

★★★★★

YOU WANT THIS MOD IF: You want 'next-level' sort of power out of your mechanically injected diesel, and you've already upgraded the turbo and intercooler.



YOUR DIESEL QUESTIONS

ANSWERED BY THE EXPERTS!

We put the call out on our Facebook page for questions you've got about your diesel that you can't seem to get a straight answer for. Here's a collection of the best, along with the no-bull, honest advice you can trust, direct from the diesel industry's leading experts

Q: HOW DOES LPG INJECTION WORK ON A DIESEL AND IS IT WORTH THE MONEY TO FIT IT?

A: "LPG injection is another form of fuel being allowed to enter the combustion process. When you add fuel you make more power and power is created by heat. My concerns with LPG on diesel stem for mainly poorly set up systems over fuelling and creating high EGT readings under sustained loads. Like any modification to your engine it must be set up correctly and reliably."

Andrew Leimroth,
Berrima Diesel

Q: IS A CATCH CAN AND DAWES VALVE NEEDED ON A CRD NISSAN PATROL DIESEL MOTOR?

A: "A quality catch can that works is a good thing. It reduces the oil residues that will be in the inlet system in turn lowering the chance of carbon buildup in the inlet manifold compliments of the EGR valve (that can't be blocked off in this model). Boost control appears pretty good in the new CRD engines so no need for intervention in boost control so far."

Andrew Leimroth,
Berrima Diesel

Q: CAN I FIT AN INTERCOOLER TO MY NON-TURBO DIESEL ENGINE? WOULD IT WORK OR WILL IT ONLY WORK WITH A TURBO?

A: "The purpose of an intercooler is to reduce the temperature of the compressed hot air coming out of a turbocharger or supercharger. Reducing the temperature of the air before it gets to the combustion chamber makes the air more dense and oxygen rich which is good for combustion."

Without a turbo charger or supercharger there is no need for an intercooler.

David Mitchell,
High Performance Diesel





Q: IS THERE ANY POSSIBLE WAY OF ELIMINATING OR SIGNIFICANTLY REDUCING TURBO LAG?

A: "Turbo lag can be related to pump wear. Most electronically-controlled vehicles suffer from lag due to the ECU reducing the fuel until boost is achieved. This is done for emission reasons and in most cases can be overcome with a power module provided the pump is in good condition. If boost is slow to come on it could be the result of an EGR valve sticking and should be checked. When EGRs stick, they tend to block the inlet manifold and this could be checked for restriction."

Scott Wood
DENCO

Q: WHAT'S THE BEST BRAND FUELS FOR MECHANICAL AND COMMON-RAIL DIESELS?

A: "That's like asking which Australian river has the best water. The quality of fuel and water varies constantly due to numerous variables that are not always controllable or foreseeable."

The fuel companies buy and sell refined diesel to each other and import refined diesel from throughout Asia. The best fuel is from the cleanest storage tanks and the cleanest tanks are invariably at a site on top of a hill where ground water runs away from the tanks. Never fill from a site where the road tanker is filling the underground tanks, you may get more than you bargained for."

Steve Marriott,
Fuel Doctors

NEXT-LEVEL DIESEL MODS

Five modifications that'll take your diesel to the next level in terms of power and economy

INLET MANIFOLDS

Particular motors like Nissan's TD42 have factory inlet manifolds that aren't optimal from the factory, flowing air into particular cylinders and starving others. This of course makes tuning extremely difficult – some cylinders run rich and some run lean. If you've got the big turbo, the big fuel pump and the exhaust and you're still chasing more power, the next step is likely an inlet manifold. Some even use a plenum chamber design, which pools air in one large chamber that all cylinders then draw evenly from.

SUPERCHARGERS

Turbos are massive for diesels, but superchargers are slowly gaining traction. The main downside is the cost, which largely comes down to economies of scale more than pure complexity of components. Companies can do a run of 100+ turbos for a 1HZ Cruiser and be confident they'll sell em all, but superchargers just don't sell as quick. Shame, really – you've gotta love full boost barely off idle and that distinct supercharger whine!

WATER/METHANOL INJECTION

Once only heard of in high-performance race-cars, water/methanol mixes injected into the combustion chamber have the effect of cooling combustion temperatures down and making for a much more complete burn of fuel. This means you can then wind more fuel into the motor, making for more power. Questions over reliability (hence the addition of water instead of straight methanol which is highly volatile) and legality mean it's not an every-day sort of modification.

LPG INJECTION

Big ten years ago, gas injection for diesel engines comes from roughly the same theory as water/methanol injection. A trace amount of (typically) LPG is injected into the combustion chamber for a more complete burn of the diesel, making for considerably better fuel economy. Companies like Diesel/Gas Australia still offer the systems, but they never really seemed to gain much popularity, for whatever reason. We ran it on a work truck years ago and the results were solid – it did indeed improve fuel economy. The biggest downside we found was that the LPG and diesel bowlers at the servo are rarely together.

ECU FLASHING

One of the latest crazes to hit the aftermarket scene is ECU 'flashing' – essentially, modifying the fuel maps within the factory ECU(s) to develop more power. It's essentially the same theory as a diesel chip, except that a plug-and-play chip doesn't change anything about the ECU itself, meaning it's easily reversible. Obviously manufacturers won't take kindly to their ECUs being modified and will use it as an excuse to deny warranty if they can, so if you go down this path, make sure you're readily able to reset the ECU back to factory conditions before it goes for any warranty work.



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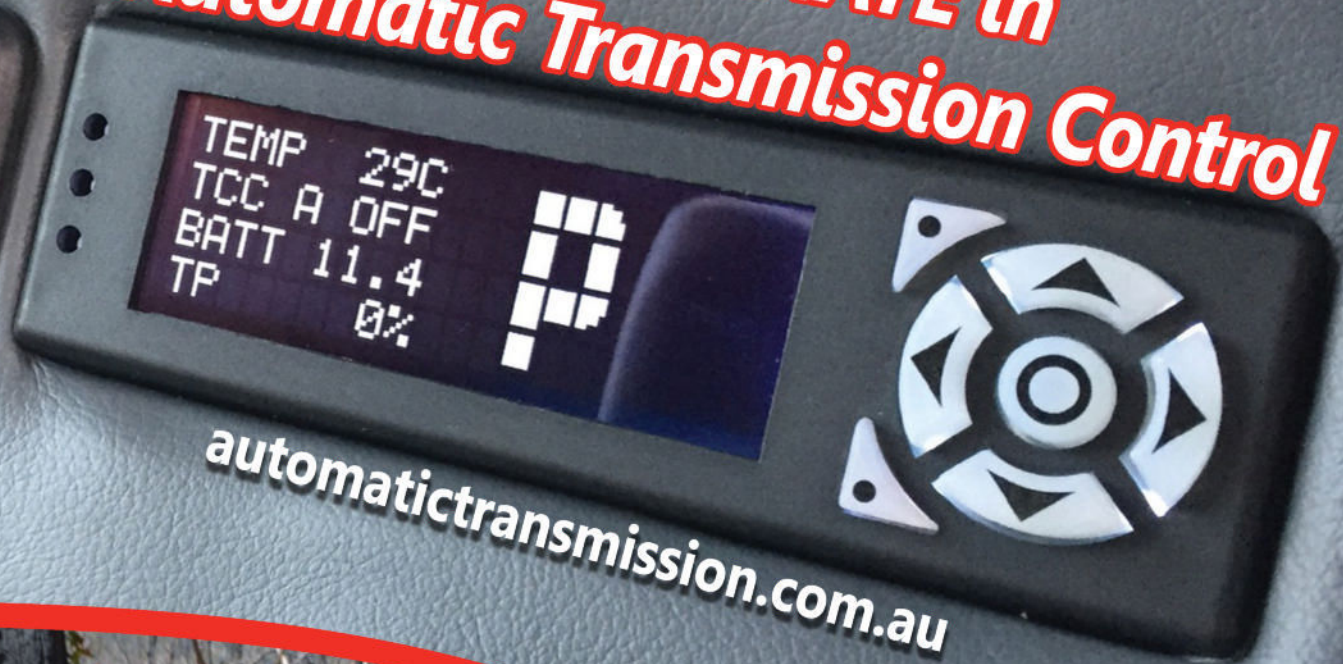


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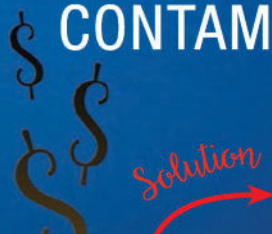


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Blokes v Girls

OFFROAD BATTLE!



WORDS BY GRAHAM CAHILL, PHOTOGRAPHY BY WES WHITWORTH



6 hilarious 4WD challenges,
6 competitors, 7 tough 4WDs and a
Cruiser Park showdown - who'll win?





Despite the strong competition when push came to snatch everybody was onboard to lend a hand



There's no doubt the girls trumped the blokes when it came to communicating and teamwork. Tamara drove a great lap with Nikki in the passenger seat and Renae 'Ballsy' taking pics up front



It was amazing to watch just how difficult driving blind folded with nothing more than your mates as guides actually is. Don't believe me? Try it for yourself



issue; lazy couple of hours and we were there. Boyley and I arrived at LandCruiser Mountain Park just after midday and spent the afternoon cruising around making sure we knew where each course would be and how it would run.

We finally finished up just on sunset ready for the day to kick off bright and early tomorrow. By this stage, Shaun, Justin and Brenno were already up at camp high on the hills out the back of the park, the fire was going and they were into beer number two. Also enjoying an amber ale and looking slightly nervous but all smiles were of course, our three competitors.

Tamara, Renae and Nikki had the good fortune of being drawn out of a hat consisting, I'm told, of several hundred hopefuls all wanting to have a crack at the title. When you look at the odds they got bloody lucky and were not going to miss out on this for anything. They were so stoked to be there that it was contagious. Pretty soon a couple of beers turned into a couple more and a great first night was had by all.

CAMP ROAD

As a rule, unless we are standing at the bottom of a death hill looking directly up, I don't really get sweaty palms before a challenge. Camp Road though is without doubt the most nervous I've felt before jumping behind the wheel of Shorty for the first time in a very long time. Not because the

We've floated the idea of an Action-style offroad battle DVD trip a number of times but when it came to crunch time, nobody could agree on a formula that would work. Then when Bushman Boyley our producer came up with the idea of a Girls Vs Boys competition we all knew he was on to a winner. 'Course, secretly the lads were pretty unnerved; getting beaten by a team of girls was a very real possibility. Not that there's anything wrong with that, least I didn't think so but then I wasn't competing; I was judging.

We were rolling into this trip off the back of filming in the Glasshouse Mountains so for once, travel distance wasn't an

SHAUNO GOT STUCK THEN BUSTED A GUARD OFF THE DIRTY 30; THE LADS WERE NEVER IN THE RACE



terrain concerned me (in fact Camp Road is just about the perfect gnarly 4WD challenge in my books, loved it) but rather because there were eight pairs of eyes, two camera men, a stills photographer and a bloody drone all ready and watching to see if I would make it. Oh and Adam told me just before pushing record that I'd better make it in one go because he wasn't going to make it look like anything else in the edit. Talk about pressure!

Turned out old Shorty walked up, double locked and no remorse we made it easy. I did however put a nice dent/scratch in the front right quarter...chicks dig scars right?

Adam and I figured we would get Camp Road done first up, great way to determine just how everyone drove, how the rigs would perform etc. My main concern was Justin in the GU. That is a touring rig through and through. I mean it's tough as old leather but it is heavy, really heavy and that canopy is a work

of art. It really didn't have any place crawling up Camp Road. I was keen to get as many eyes on the rig as possible on the way up to avoid damage and I think that was achieved despite a knock to the rear tool boxes, which Justin knows are going to take a hit from time to time.

Tamara has driven Camp Rd more than all of us combined so it was no surprise when she piloted the little tractor up with zero drama. Nikki was as nervous as a



This was Brenno's idea and given he broke it, we figured he ought to fix it. Believe it or not this "fix" got the big GU all the way back to Sydney. Good effort mate



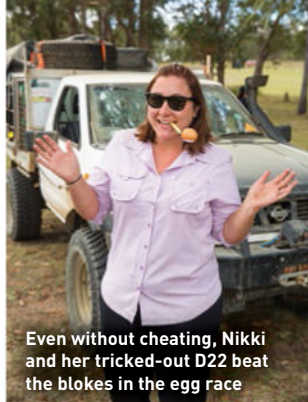
Project GU and the Dirty 30 definitely copped their share of knocks as the challenges tested all six competitors

Justin drove really well to keep his big, heavy tourer powering through the narrow and rutted tracks we tackled at LCMP





Happy as a pig in mud; Brenno lives and breathes this stuff



Even without cheating, Nikki and her tricked-out D22 beat the blokes in the egg race

OIL TIP BROUGHT TO YOU BY ENGINE ARMOUR DIESEL



It's no secret 4WD Action readers love a turbo diesel. In fact, six out of the seven 4WDs on this trip were turbo diesels. But do you know your turbocharger is capable of reaching temperatures of over 1000 degrees Celcius with the central shaft spinning at around 200,000 RPM?

The only thing stopping this high speed shaft from rubbing metal to metal in the small bearing is a tiny film of oil - smaller than the thickness of a strand of hair - that's constantly circulated.

The right engine oil is really important in turbo charged diesels. If you don't change your oil regularly or use an incorrect grade, it doesn't take much for a bearing failure or for the turbo charger to form heavy carbon deposits.

Valvoline's Engine Armour Diesel with synthetic technology has been specifically made for 4WDs fitted with turbochargers.



As you can see if it wasn't for me lending a hand Shauno's 'Cruiser might have had its second rollover of 2015. You owe me a beer mate!

mullet in a tank of barra, to her credit though she wheeled with no sign of backing down and but for one very large hole, would have driven from bottom to top unaided. Now Renae, or Ballsy as we all got to know her as, doesn't do much low range work. She races a class 8 GU in the off-road racing circuit and is used to going hard and bloody fast. This slow stuff was foreign to her. The unlocked GU did struggle on the deep ruts and given she has had it since new with barely a scratch; I think I was panicking way more than her about panel damage. She too gave it a red hot go, getting so, so close.

In the end the boys took line honours at the Camp Road Challenge and were off to a good start.

WATER CHALLENGE

We came up with the idea for the water challenge after having seen it late one night at an outback pub on a weird Japanese game show on the telly. Now to be honest they carted the water slightly differently, we won't go into that but regardless, our take on the idea using the 4WDs would work just the same.

Using the dry river was a stroke of genius on my half as it played off against the dusty dry creek bed which ordinarily would be rushing with water. Given the dry conditions it was now bereft of liquid, our 4WDs carrying their precious cargo represented hope that one day the mighty river would run again. Nah, what a load of bull, it was just really bouncy; perfect!

At the outset, I was fairly confident the girls would come out on top as I figured they would have a far greater care factor and patience. I couldn't have been more correct. All three girls really took their time and actually drove with a great deal of precision. I say all three but the truth is Nikki just went in hard and hoped. Despite throwing me around in the cab like a rag doll, she actually didn't finish too bad. When I saw how much water they had collected though, I have to admit to thinking it wouldn't be hard to beat. I didn't count on Brenno.

Brenno's tactic was to get through as fast as possible and not spend too much time rocking around, thus keeping maximum water in the bucket. It didn't work, not at all. Brenno finished

with little more than a bee's spit in the bottom of the bucket. Justin perhaps did the best out of all six punters. But Shauno got stuck then busted a guard off the Dirty 30; the lads were never in the race. They lost and lost convincingly.

That meant we were one a piece going into the third challenge.

EGG AND SPOON

Now, the truth behind this course is that I didn't for a second think the punters would drive this without getting egg all through their 4WDs. So much so that Adam was keen to hard boil the eggs prior to handing them out. I figured that as soon as they worked out they were hard boiled they wouldn't care, so I assure you, those eggs were the real deal. Oh and that super steep, off camber climb midway through, that was a hell of an obstacle in old Shorty I gotta say. Almost had me a brown undies moment when I first tackled it; had to reverse and have another crack. Practise makes perfect though and I did it in one go for the camera, like an eggspert (see what I did there).

The lads were up first and I have to say I was impressed with the agility they had getting around, not to mention their ability to keep that egg more or less in place. They set some fast times and only busted one egg. However, once again Brenno let the boys down by using some old bearing grease he found in the GU as glue to hold the egg in place. Couple that with the fact that he lobbed an egg at me as he came over the finish line meant he savagely let the team down on points scored.

The girls took their time and managed to drive the course with zero casualties and in doing so, posted reasonable group times just behind the lads. Of course this meant the victory would go to the boys had it not been for the points deducted from Brenno. The lads lost convincingly.

Nikki had a heart in the mouth moment up top of the course after we had finished when she took her eye off the line for just a split second and slipped into a very deep and very vertical hole on the driver's side. Both passenger wheels were off the ground; it was a close call

indeed. A quick winch from Shorty had her shaken but not stirred and back on solid ground.

This now put the girls at two wins to the boy's one.

MUD

Just as with the blindfold challenge, while setting up the mud course I found myself in deeper water that I'd wanted. See I was trying to add just one more mud hole to the course, something our competitors could really get their teeth into, when I bit off more than Shorty could chew. Yep, water in the doors up the seats, mud everywhere and me on the end of a snatch strap. Bugger; still I had fun.

Now I almost knew before even starting just who would win; my bets were on Brenno by a country mile, Shaun and Justin neck to neck with Ballsy very close behind followed by Nikki and Tamara fighting it out. That's exactly how it did go down as well. As a result, the boys won the mud course on time ahead of the girls by nearly 30 seconds.

However, once again I didn't factor a Brenno into the equation.

On the way to the course he busted two guards off the GU, he fell head-first into one of the mud puddles while we were walking the course (and while he was wearing an \$800 radio microphone too), his winch rope came undone during the course and was dragging on the ground and just to top it off, he blew the fan through the radiator and knocked the GU out of the comp! As a result of that hour of power, the boys had some severe point penalties which meant while they won the challenge; they got zero points for doing so.

Girls still in the lead.

BLINDFOLD

This is the one I'd been the most hesitant and consequently surprised about. See to me it wasn't hard enough but then I didn't drive it blindfolded. As it turned out, both Shauno and Tam said once they had finished that it was perhaps the single scariest thing they have ever done!

I had no idea who would win this one but if I had to place a bet I'd have said the boys. Despite a shaky start from the girls when Tam nearly drove directly into a tree, they just dominated. They completely wiped the floor with the boy's time and could have stopped for lunch half way through and still won.

That left the girls well and truly in front with the cooking to go.



Brenno has skills and no fear, it's a potent combination that for reasons I have no control over nor understanding of, seems to work wonders



Brenno did get just a little competitive...



The new body on Shorty means the old/new bus doesn't drain as well as the rust holes used to allow. Check out the mud on that front left; no wonder she had the speed wobbles




COOKING

Being the judge of a cooking comp has two clear benefits; the first is you get to sit around the campfire enjoying a beer while others cook your tea and second, you then get to eat it. As far as I'm concerned I was the winner that night.

Okay, so I have to come clean here; I actually thought the lads maybe just squeezed past the girls on the cooking front, that roast was utter perfection; however the buggers were so damn cocky about it while the girls were humble that I just had to give it to the girls team. That might be a bit one eyed but

stuff it, the girls already had this thing won!

CONCLUSION

So, by no small margin, the ladies took out the inaugural 4WD Action offroad battle. Congrats girls! You know I'm going to make a bold prediction that we are not done with that style of event, it's just way too much fun. I reckon we will hold another of these in the future and I'd be stoked if you won yourself a place to compete. All we need to decide moving forward is whether the boys are better off with or without Captain Brenno! 

FACT FILE

WHERE

Landcruiser Mountain Park is an easy 2 hour drive from the Sunshine Coast or Brisbane via the small town of Kilcoy.

CAMPING

The park has been rated as one of the top ten places to camp in south east QLD and you are allowed to camp pretty much anywhere. The locations are literally million star. Some have toilet and shower facilities others just fire pits and a few are 100% bush camping at its finest.

WHAT TO TAKE

If you wish to tackle the more notorious tracks within the park, our advice is take spares and plenty of recovery gear plus a change of underwear. Otherwise you will need everything you would normally take camping. During the cooler months be advised it does get very cold at night being up in the mountains.

BEST TIME TO TRAVEL

LCMP has something to offer at all times of the year, don't let the weather dictate what you do, just go.

FUEL AND SUPPLIES

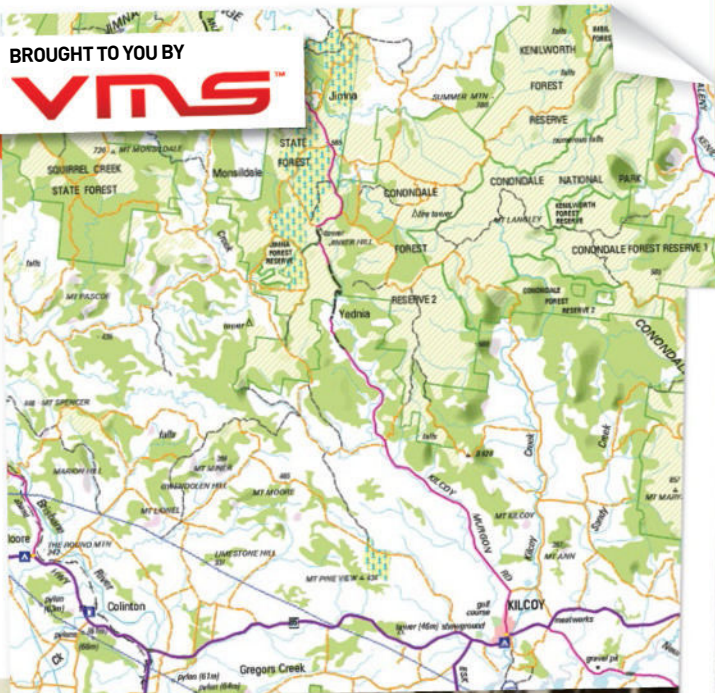
Kilcoy is your closest for all supplies.

TRIP STANDARD

Trips are rated A though E, with A meaning only suitable to vehicles with an extreme level of off-road modifications and E meaning perfectly suited to all types of 4WD vehicles. Depending on just what you are interested in the park ranges from A+ to E.

BROUGHT TO YOU BY

VMS



It might have been drier than a dead dingo out there but look hard enough and there is always water to be found somewhere



Here Ballsy and Nikki are cooking up a storm, but I have to say the bloke's fantastic roast might have just gotten them over the line for this challenge



The lads sure did a bloody good job of what was one of the most delicious camp oven roasts I've ever had



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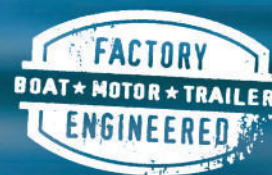
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COIL CONVERTED 'CRUISER

WORDS BY DANIEL REBER PHOTOGRAPHY BY DAVID WOLTSCHENKO →



When you want a no-bull, no-compromise super-tourer, you've gotta get your hands dirty – check out this wild Franken-Cruiser!






• 80 SERIES DIFF CONVERSION • CUSTOM BUILT 1HZ/1HD-T MOTOR • FULL BARE METAL RESTORATION

Life's about compromises; if you want that Friday night with your mates at the pub, you can bet your arse you'll be mowing lawns and painting the back fence on Sunday. If you want a 4WD set up for touring, then you're going to cop some hits when you get into the toughest terrain – or are you? For 4WDers however, we don't settle for what a manufacturer produces off the line. We see a weak point, we strengthen it. We take dislike to something, we change it. We need to get further, we modify it – it's just part of the lifestyle.

For a select few though, with the skills to do so, often what a manufacturer rolls off the line simply isn't close to the image they've got in their head. They take the best points of the 4WD

they've got and get stuck in to turning it into a shadow of its former self and ultimately end up with their dream 4WD – a rig to truly, do it all. That's exactly what boilermaker, Craig has done with the incredible 4WD you're about to see.

Craig's 75 Series Land Cruiser turned up in his driveway as a rusty junker, picked up for a little more than \$4,000. What followed was not only a ground up restoration of the legendary 4WD, but also a build and modification process that would see the Troopy overcome its factory shortcomings to mix it with the toughest trucks anywhere in the country. A custom built motor, a full coil conversion and twin lockers, plus some cracking custom barwork – is this Franken-Cruiser the ultimate tough touring Troopy? You decide. 

↓ EXTERIOR

- Bare-metal respray, rust repairs and replaced bonnet, guards and cab
- ARB steel commercial winch bar
- Custom steel rear bar with twin swing away carriers and integrated tow hitch
- Steel ARB roof rack and side awning
- Steel radiator bash plate
- 9,500Lb TMAX winch
- Custom modified bonnet with custom scoop
- Narva 225 spotlights

"Being a boilermaker by trade, it was too easy for me to knock up a rear bar, rather than pay for an off-the-shelf item," says Craig. "I built the main structure of the bar using 40x40x5mm RHS and knocked up the plate sections with 3mm mild steel, which I folded up to suit. All I really paid for with the whole bar was the steel, plus the latches and stub-axles. I've saved thousands – easily."



**"I BROKE THE
MOTOR IN WITH
A TRIP TO
THE CAPE"**

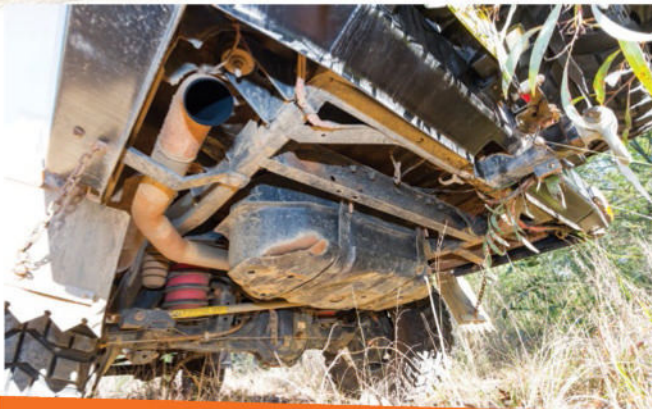
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THE ENGINE – 1HZ/1HD-T HYBRID

- Rebuilt 1HZ, using 1HD-T block, crank, rods and ceramic coated 1HZ pistons
- Blocked stripped, cleaned and crack tested
- Crank lished and balanced for better clearances and smoother running
- High flow oil pump
- New 1HZ cylinder head and new valve gear
- 1HD-T factory 12mm fuel pump, tuned to work with 1HZ injectors
- Upgraded Kinugawa CT26 turbocharger with larger Garret compressor wheel – 14psi
- HPD top-mount intercooler and thermofan – fan lowers EGTs by up to 40 degrees
- 3in straight through mild steel exhaust system
- 58mm Fenix aluminium radiator – water temps range from 88-90 degrees
- Exedy heavy duty clutch

When your engine is due for a freshen-up, there's no sense in keeping the engine too stock when there's the opportunity to push some limits and breathe new life into the motor. "Using the 1HD-T bottom-end gave me bigger conrods and gudgeon pins, which suited the turbo setup much better," explains Craig. "I fitted ceramic coated 1HZ pistons, which can handle 100-150 degrees extra in the EGTs. I didn't want to mess around with refurbished or second hand parts, so I just bit the bullet and decided to bring the motor back to new condition." Yep, you read that right, this engine's built to handle 700 degree EGTs. "By carefully tuning the 1HD-T's direction injection, injector pump I was able to make it work with the 1HZ's indirect injection injectors," says Craig. "I haven't had the truck on the dyno yet, but I broke the motor in with a trip to the Cape – I trust the setup."

ENGINE REBUILD JARGON

BORE – Boring an engine is the process of removing block material to increase the size of the cylinder bore. This can be used to freshen up a tired motor, or to increase its displacement

STROKE – To stroke an engine is to increase the distance that the pistons travel downwards, allowing the motor to inhale more air, fuel and subsequently make more power

HONE – Honing a motor is the process of creating a good finish on the cylinder bore to allow a better seal between the piston rings and the block

LINISH – Linishing is a process of sanding and polishing an engine part (In Craig's case the crank) to improve its flatness

BALANCING – Balancing a motor involves removing/adding miniscule amounts of weight to all of the engine internal, rotating parts to match their weights precisely. This results in a much smoother running, more efficient and reliable engine

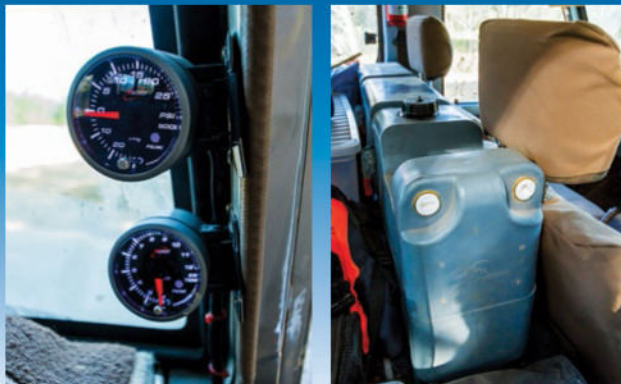


The 1HZ/1HD-T hybrid motor has given Craig an extremely robust engine, built to handle EGTs up to 700 degrees – post turbo!

INTERIOR AND TOURING GEAR

- Redarc dual battery isolator
- 800Cca cranking battery, 105Ah deep cycle auxiliary battery
- Outback drawer system in rear, spanning full length of cargo area
- 57L dual-zone Engel fridge and MSA drop-down fridge slide
- 65L poly water tank, gravity fed through hose out of driver's door
- GME 4500 UHF and aerial
- Racetech boost and EGT gauges

The whole ethos behind the build was to maintain the inherent touring qualities of the Troopy, while bringing the off-road ability up to 80 Series spec. To do so, Craig's fitted the Troopy with a full drawer system from Outback as well as a Redarc dual battery system and gravity-fed water tank. Simple? Yes. Effective? You betcha.



**THIS ENGINE'S
BUILT TO
HANDLE 700
DEGREE EGTS**





The rear tank was moved back to fit the suspension frame



RUNDOWN

VEHICLE: 1990 Toyota LandCruiser Troopcarrier

ENGINE: 1HD-T block, 1HZ head – 4.2L inline six-cylinder turbo diesel

GEARBOX: 5-speed manual

4WD ACTIVATION: Part time, manual locking hubs

SUSPENSION: 4in raised coils, 80 Series diffs and steering gear

WHEELS AND TYRES: 315/75R16 Mickey Thompson Baja Claws, 16x8in steel Sunraysia rims



SUSPENSION, DRIVELINE, WHEELS & TYRES

- Front and rear diffs/housings from 80 Series – 200mm track increase
- Superior Engineering bolt-on diff guard
- Tough Dog adjustable Panhard rod
- Superior Engineering adjustable steering rod
- Full 80 Series coil suspension, using 80 Series spring/shock mounts/towers
- 4in extra heavy duty Dobinson coils, front
- 4in 400kg Old Man Emu coils, rear
- Custom built drop boxes and Superior Engineering Superflex radius arms
- ARB Air Lockers in 4.56 Nitro diff centres – purge valve fitted to rear airline to stop oil blowing up lines
- Heavy duty front CVs
- 20mm rear tailshaft spacer to accommodate lift
- 80 Series Toyota steering components
- 315/75R16 Mickey Thompson Baja Claw tyres, 16x8 steel Sunraysia rims

"I started the setup with the rear spring mount frame out of an 80 Series, and began narrowing it down to fit inside the Troopy chassis," explains Craig. This meant moving all of the spring mounts and upper control arm mounts on the diff to suit and also required me to move the rear fuel tank rearwards to fit the suspension frame in the right position and fabricate new lower control arm mounts." Once everything had been trial fitted and tack welded in place, Craig did some last minute measurements before welding everything into place in accordance with the engineer's wishes. Once completed, the suspension had a little bit of sag when loaded up, so Craig fitted some airbags to the rear to help out when fully loaded. One of the common complaints people have when fitting air lockers is oil blowing back up the air-lines, to combat this Craig fitted a \$50 purge valve from ARB to the airline which has solved the problem completely.



Suspension mounts had to be fabricated and welded in place to suit the narrower chassis width of the Troopy, compared to the 80 Series



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WORDS BY TRAVIS ANNABEL, PHOTOS BY 4WD ACTION →



Whether you're out bush with the whole family or trying to impress your mates around the campfire - here's five camp recipes that'll get everyone drooling!



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THIS IS THE NUMBER ONE TRICK TO NAILING A ROAST



The trick to a successful camp oven roast is to ensure you've got a good spread of coals on the top and bottom of the oven



We chose a pork belly roast for our masterpiece, however any type of roast works well in the camp oven

THE BEST EVER CAMP OVEN ROAST

There's nothing better than tucking into a feast of roasted meat and veggies. Here's how to smash the old Sunday roast out of the park!

This is the number one trick to nailing a roast. It doesn't matter what cut of meat you prefer – pork, lamb or beef (we chose pork), this recipe and technique will ensure you get it right every time.

The number one trick to nailing a camp oven roast is getting the spread of heat just right. It's important not to place

your camp oven too close to the fire. Instead, scoop out a shovel load of coals and make a bed for the camp oven to sit on. Then, place another scoop of coals on top of the camp oven. Check your cooking feast every half hour or so, and make sure you use fresh coals each time you check it.

INGREDIENTS

- 1kg meat roast (Pork, lamb or beef)
- ½ a pumpkin
- 1 large sweet potato
- 4 medium sized potatoes
- 4 small onions
- 2 garlic cloves
- Olive oil
- 2 sprigs of rosemary
- Salt and pepper
- Gravox

TECHNIQUE

1. Chop veggies to desired sizes, and brake up and de-skin garlic
2. Prepare camp oven by drizzling olive oil to cover the base. Scrunch up two lengths of al-foil and place at the bottom of the camp oven to keep meat off the surface
3. Rub meat in olive oil and season with salt and pepper. Sprinkle chopped rosemary over the meat.
4. Place meat in camp oven, and place on bed of coals. Place coals on top of oven. Leave for 1 hour.
5. Add veggies and garlic cloves to camp oven. Refresh coals, and cook for a further ½ hour.
6. While meat and veggies cook, prepare gravy using Gravox powder in saucepan.
7. Check meat and veggies. If further cooking is required, place back on fresh coals for ½ hour intervals until cooked to your liking.
8. Remove meat and veggies from camp oven, and add any of the juices from the camp oven to the gravy.
9. Serve up and humbly accept gratitude for an epic camp feed.

QUICK FACTS

PREP TIME: 30 mins

COOKING TIME: 1.5 – 2hrs

SERVINGS: 4-5



THE BEST CATCH & COOK FISH N' CHIPS

If you ever wet a line on a trip, here's the best way to cook your catch of the day!

There's plenty of ways to cook your catch of the day, but we reckon that it's hard to go past the classic fish n' chips, especially when the fish is fresh from the ocean!

The hardest part about cooking this meal is scaling and filleting the fish itself. We're not going to lie, it's something that

takes a bit of practice, but it's well worth the effort!

QUICK FACTS

PREP TIME: 30mins

COOKING TIME: 10mins

SERVINGS: 4



Freshly caught fish, fried to perfection – there's nothing better!

INGREDIENTS

- Freshly caught fish
- ½ cup of plain flour
- ½ cup of breadcrumbs
- 2 eggs
- Dash of milk
- Mixed dry herbs
- Garlic powder
- 4 potatoes
- Salt and pepper
- Olive oil
- 1 lemon

INGREDIENTS

1. Descale, debone and fillet the fish
2. Prepare crumb mixture by mixing together flour and breadcrumbs, adding a pinch of salt, and a few shakes of garlic powder and mixed herbs
3. Crack eggs into a bowl, add a dash of milk and beat
4. Dip fillets of fish into egg mixture, and then coat in crumb mixture
5. Cut potatoes into chips and sprinkle with salt and pepper
6. In a frypan, heat ½ a centimetre of olive oil until hot on a gas stove. Add chips and shallow fry until crispy
7. While chips are cooking, place BBQ plate over heat and spray with oil – alternatively, you can use a second frypan on a gas stove
8. Once BBQ plate is hot, fry fish fillets for 3-5 mins on each side
9. Serve fish and chips with a quarter of lemon



The crumb mixture will help ensure the flavour and moisture remains in the fish meat, while the outside becomes nice and crispy



**THIS ONE SIMPLE RECIPE
CAN MAKE A DESSERT,
SNACK OR BREAKFAST**



Add choc chips and butter or golden syrup for a spectacular dessert!



The best part about a damper is that it can be a sweet or savoury meal

INCREDIBLE CAMP OVEN DAMPER

The quintessential bush recipe, knowing how to cook a proper camp oven damper is a must!

Nothing says Aussie camping like a freshly cooked camp oven damper. And the best part about cooking a damper on your campfire? It's so easy!

Here we've provided a recipe for a basic camp oven damper, but we've also provided a few variations. Looking for a quick and easy dessert to keep the kids happy? Throw in some choc chips and golden syrup. Looking for a tasty brekky? Add some cheese and bacon. Want your damper to be the most light and fluffy damper ever? Use beer instead of milk.

The key to getting damper just right, is ensuring you don't get the camp oven too hot. An overly hot oven will result in burnt crusts. The trick is, much like the roast we discussed earlier to keep it at a medium heat by placing a bed of coals a bit away from the fire, and placing more coals on top of the oven.

QUICK FACTS

PREP TIME: 20 mins

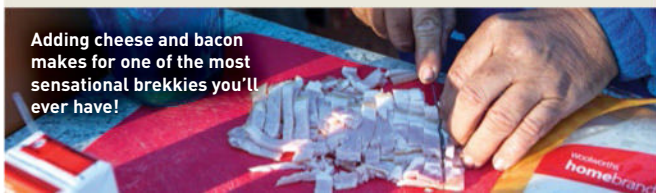
COOKING TIME: 30 mins

SERVINGS: 4+

INGREDIENTS

- 3 cups self-raising flour
- Pinch of salt
- 5 teaspoons of butter
- 1 cup of milk
- 1 table spoon of sugar (optional)

Adding cheese and bacon makes for one of the most sensational brekkies you'll ever have!



TECHNIQUE

1. Prepare your camp oven by greasing with a bit of butter, and then dusting with flour
2. Add the salt (and sugar if using it) to the flour and mix.
3. Add the butter to the mixture, and rub into the flour until the mixture resembles breadcrumbs
4. Add the milk and mix together using a knife and a cutting motion. Keep working the mixture until the dough forms
5. Use your hands to combine the dough into a ball
6. Cut four lines in the shape of an asterix on the top of the dough – this will make it easier to break apart
7. Place in the centre of the camp oven with the lid on, and place the oven on a bed of coals away from your camp fire. Cover the top of the camp oven with coals so the medium heat is uniform.
8. Bake for 30 mins. If further cooking is required, place back on fresh coals for 10 min intervals until cooked perfectly.
9. Serve.

VARIATIONS

DAMPER DESSERT

For a quick and easy desert, add a couple of extra table spoons of sugar to the mix, and a bag of choc chips. Cook as normal, and then serve with golden syrup.

CHEESY BACON DAMPER

Don't add the sugar to this one. Instead, add 100-200g of diced bacon and shredded cheese. Cook as normal, and serve with butter. This is a sensationally easy brekky!

BEER DAMPER

For the fluffiest damper ever, replace the milk in the basic recipe with a can of beer, and cook as normal. This version can be served with golden syrup for those with a sweet tooth, or with butter for those who are in a savoury mood.

BRILLIANT BLACK BEER LAMB SHANKS

Slow-cooked lamb shanks in Guinness - sign us up

You don't have to be a Guinness drinker to know how well it works in food. In fact it's not just Guinness, it's any black beer or stout. There's something about it that just brings out the flavour in slow-cooked red meat, and there's no cut of meat that it goes better with than the good old lamb shank.

This is a pretty simple recipe, but the results are nothing short of spectacular. The best side

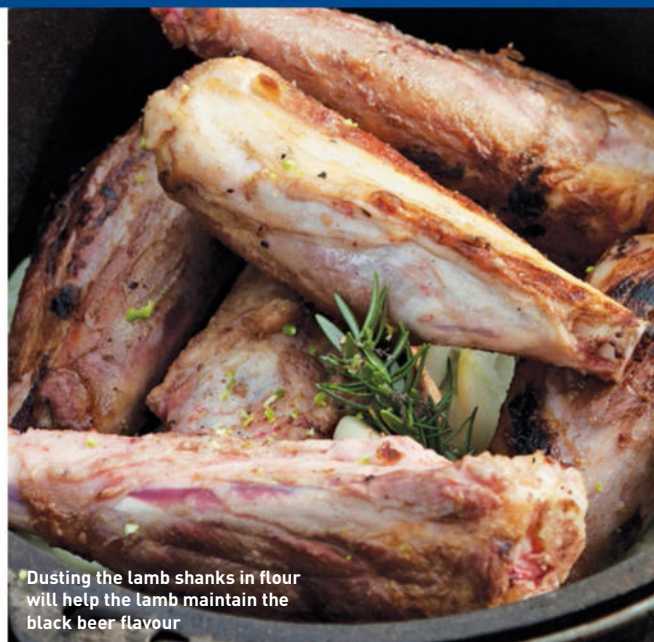
dish for it is campfire mashed potato and your greens of choice – the mash soaks up all the juices and sauce, and makes for the absolute perfect cold weather meal!

QUICK FACTS

PREP TIME: 40mins

COOKING TIME: 2 Hours

SERVINGS: 4



Dusting the lamb shanks in flour will help the lamb maintain the black beer flavour

INGREDIENTS

- 4 lamb shanks, get your butcher to French trim them
- ½ cup plain flour
- 1 longneck of black beer
- ½ cup stock
- 4 cloves garlic
- 4 small onions
- 4 sprigs of rosemary
- Olive oil
- 4-5 medium potatoes, peeled
- Tablespoon of butter
- Dash of milk
- Pinch or two of salt
- 1 broccoli

Slow cooking with black beer – this will get you warm, no matter how cold your campsites is!



TECHNIQUE

1. Dust the lamb shanks with the flour
2. Prepare your camp oven by coating the bottom in olive oil
3. Place lamb shanks in camp oven, add stock, black beer, garlic, onions (de-skinned, but whole) and rosemary sprigs
4. Place camp oven on bed of hot coals away from camp fire, and cover lid with coals. This is a slow-cooked recipe, so ensure your camp oven is maintaining a medium heat at most. Leave for one hour
5. While lamb is slow cooking, prepare side dishes. Boil potatoes until soft, then mash together with butter and milk, until the mash is smooth and creamy. Add salt and pepper to taste
6. Cut broccoli into chunks, and pan fry in olive oil with a bit of salt to taste. If desired, add sliced garlic. Stir-fry until broccoli is cooked, but not too soft
7. Check lamb shanks after one hour. Refresh coals and continue cooking for half hour intervals until lamb is close to separating from the bone
8. Serve lamb shanks onto bed of mashed potato, using the remaining juices and liquids from the camp oven as a sauce. If it's too runny, add a bit of corn flour or Gravox powder to thicken

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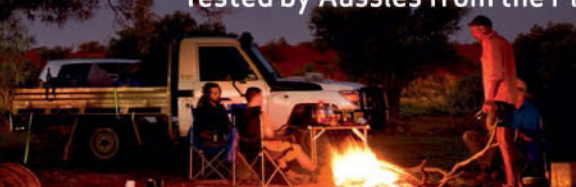
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BUSH PIZZAS DONE RIGHT

Everyone loves a good pizza! Here's how to nail them at your campsite

For many families, home-cooked pizzas are the go-to choice when you're after a simple and easy meal. Here's the thing – they can be just as quick and simple at your campsite!

Now for anyone looking to decrease the time that these pizzas take to prepare, then you can always use pre-made pizza bases or even wraps. We're going to make our own bases, though, as they take the humble home-made pizza to the next level!

Also, you have a few options when cooking them. We used a camp fire hotplate, however, it's

just as easy to cook them in a pan on a gas stove, or even in a camp oven. The choice is yours!

Pizza toppings are always a bit of a personal choice too, so don't be afraid to mix things up and replace any of the suggested toppings with your own personal favourites.

QUICK FACTS

PREP TIME: 40mins

COOKING TIME: 30mins

SERVINGS: 4+

Pizza toppings are always a bit of a personal preference – the best thing about DIY pizzas are that you can make them exactly how you like!

INGREDIENTS

- 2 cups plain flour
- 1 sachet yeast
- 1 cup warm water
- 2 pinches of salt
- 1 teaspoon of sugar
- Mixed dried herbs
- Dried garlic powder
- Spray oil
- Pizza sauce
- Pizza cheese mix (Mozzarella, tasty and parmesan)
- Topping of your choice (Our pic: Sliced salami, onion, capsicum, mushrooms, sundried tomatoes, pineapple, olives)

TECHNIQUE

1. Dissolve yeast, sugar, salt and a few shakes of garlic powder in a mixing bowl with water.
2. Mix in flour and a few shakes of dried mixed herbs, and knead until dough consistency is formed. Wrap bowl in cling wrap and leave in sheltered area for 20mins while dough rises.
3. Prepare toppings while dough rises.
4. Separate the dough into four pieces and flatten them out, remembering to spray the prep surface with oil so it doesn't stick.
5. Evenly cover bases with pizza topping, and add any additionally desired garlic powder or dried herbs.
6. Sprinkle a small amount of cheese mix onto base (this helps the toppings stick).
7. Evenly spread toppings over the base.
8. Top with cheese – the more the merrier if you ask us!
9. Place BBQ plate over coals – be careful not to place it over excessive heat and flame. Spray surface with oil.
10. Place pizzas on the BBQ plate. Depending on the size of the pizzas, you may need to do them a couple at a time.
11. Cover the pizzas – this is necessary to ensure the cheese melts and the toppings cook. It's up to you what to use to cover them – we used a couple of up-turned camp ovens.
12. Cook until the cheese is melted and starting to brown, and the underside of the base is golden-brown.
13. Serve.

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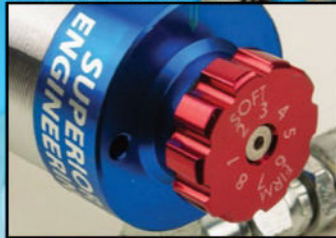
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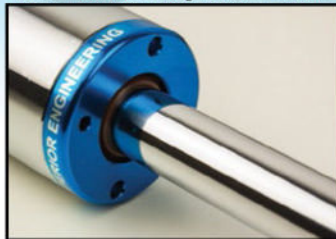


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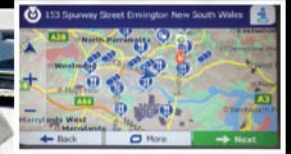
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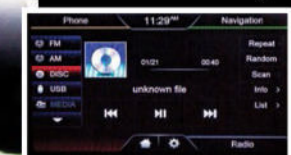
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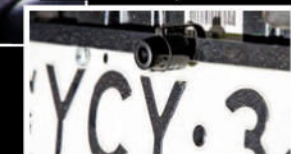
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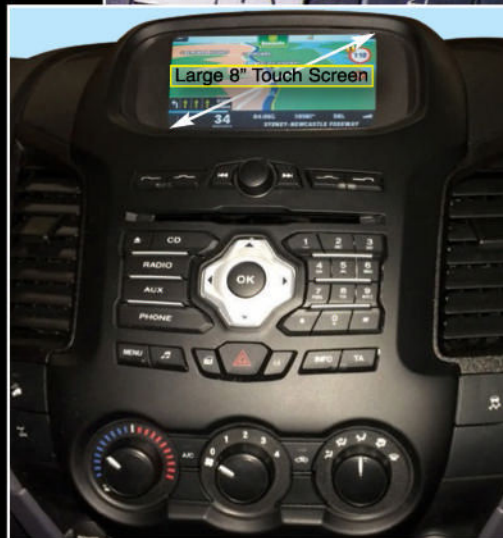
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SOUTH AUSTRALIA'S **SECRET** **SIDE**

WORDS BY STEVE COLLINS PHOTOGRAPHY BY MEGAN STACE

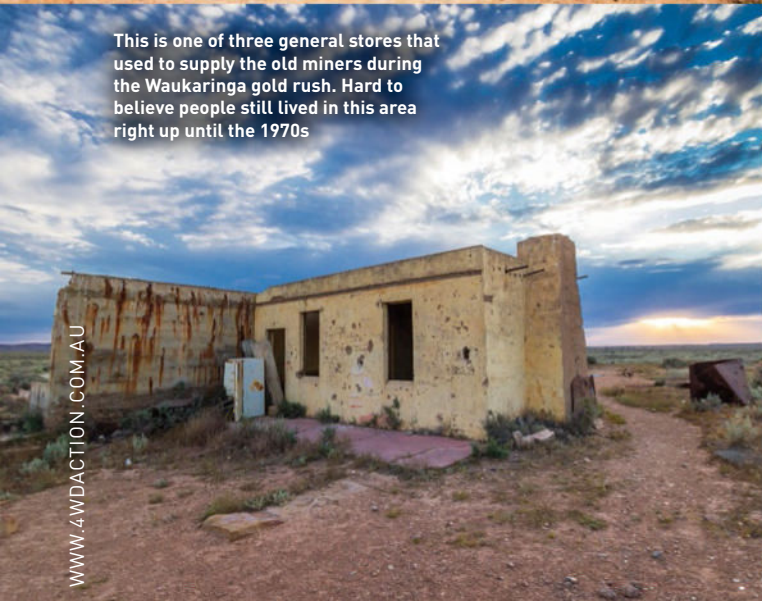


Why the Gammon Ranges has
overtaken the Flinders as South
Oz's best 4WD destination





This huge piece of basalt is part of a mineral display at Arkaroola which showcases the richness of the land out here. Now, where did they put that big nugget of gold?



This is one of three general stores that used to supply the old miners during the Waukaranga gold rush. Hard to believe people still lived in this area right up until the 1970s

Pop quiz; who knows where the Flinders Ranges are? If you answered 450 clicks north of Adelaide on the eastern side of South Australia, you'd be spot on.

How about the Vulkathunha - Gammon Ranges? ...Uh oh, we sense a hesitation. Not quite sure? That's alright; you wouldn't be the only one. That's because the Gammon Ranges has been overshadowed by the more popular Flinders for years, largely because of a huge boom in tourism.

Thing is, in terms of 4WD adventure, it's chalk and cheese. The Gammon Ranges is the supercharged V8 trophy truck of 4WDing in South Australia, and the Flinders is well, the air-conditioned tour bus. Great if you're into that sort of thing, but if you're looking to lock the hubs in - the Gammon Ranges is where it's at.

ARE THE FLINDERS GOING DOWN THE GURGLER?

Here's the thing. These days there are bugger-all proper low-range 4WD tracks left in the Flinders Ranges. Alright, we'll say it. It's a bit of a yawn if you're looking to give the stubby stick a real workout, that is, unless you want to pay for the privilege.

You see, because the Flinders is only a few clicks out from Adelaide, what were once goat tracks are now super highways paved for the hordes of city slickers that explode from tour

bus after tour bus wanting to get a look at South Australia's tallest mountain range.

Don't get us wrong, it's great for tourism. It's awesome for the economy. And it's the best thing for the small towns in the region. But, it's at the expense of traditional 4WDing and camping. We no longer have the ability to experience this spectacular part of the country in its natural glory. Anything worth seeing is bollarded or locked behind gates, and the 4WD tracks that are left are slapped with hefty tariffs or overtaken by tour companies. And that's what makes the Gammon Ranges so good by comparison.

There are over 100km of the most scenic 4WD tracks in and around the Gammon Ranges, most of them absolutely free, making it 100 times more of a 4WD adventure than the Flinders. The Gammon Ranges have got all the same unique flora and fauna, plus it's home to seventh largest lake in Australia, Lake Frome, as well as the traditional hunting grounds of the Adnyamathanha people.

WHAT'S WORTH CHECKING OUT

If you've arrived early enough to fit in a bit of 4WDing before dinner, it's definitely worth checking out the Mt Jacob Back Track. This short 13km track is slow going and will see you negotiating river beds, wash outs, steep hill climbs and more gorges than you can poke a tailshaft at.

The Mt Jacob Back Track balances technical challenges without discriminating against those with relatively standard vehicles. It's an awesome photo opportunity and lets you appreciate the rugged landscape of the surrounding Gammon Ranges. What's better is it's not too far from the Arkaroola camp grounds which means you can sneak off and warm up the transfer case and still be back in time to watch the sun set over the gorge.

If you want to turn the 4WD dial up a few notches, Echo Back Camp Track is a must see. Access to this track requires a high-clearance, low-range and a quick set of hands behind the wheel. You'll need to leave a \$50 deposit for the key to the gate as this one runs through private property. As soon as you head through the main gate it is straight into low-range to climb up a steep ridge before plunging straight back down into a dry creek bed. While it is only a few kilometres long, the track is slow going and takes a solid 3-4 hours to get through.

Alternatively, not far from the Idninha Ruins you join the

There are literally hundreds of kilometres of 4WD tracks in the Gammon Ranges. Make sure you put the Wortupa Loop Track on your to-do list



If anyone ever tries to tell you there are no chicks in the outback, they lied! This is a common sight during the September and October months

Who'd have thought you'd be driving through this much water in the middle of the outback? The surrounding gorges often funnel rainfall down into a handful of creeks which only adds to the adventure





Talk about a loo with a view. You'd pay millions for a view like this in the big smoke



If you're coming via Yunta, make sure you stop and check out the old Waukaringa gold mine ruins. You could spend hours here exploring and it makes a cracking place to pull up stumps for the night



Idninha Track that heads towards Mainwater Well camping area and Gammon Yards. A little further along is the Gammon Yards which marks the start of the one-way Wortupa Loop Track. This 80km goat track winds its way through the heart of the Gammon Ranges, takes about six hours to complete and is guaranteed to test every 4WD bone in your body. It's not quite as rocky as some, but it's steep and loaded with lookouts which are perfect for keeping the kids entertained along the way.

Oh and before we forget, don't leave without checking out Lake Frome. This 100km long, 40km wide salt lake lies below sea level and only rarely fills with brackish water during heavy wet season down-pours. Following the only track in,

you'll drive along the Balcanoonna Creek, cross the dingo fence and pass over low sand dunes before arriving at the western side of the lake. What's unique about this area is that it's declared a Cultural Use zone, which means it's off limits to the public between 3pm and 5am because the local Adnyamathanha indigenous people still use this area for hunting.

TRACK CONDITIONS IN THE GAMMON RANGES

The difficulty of the Gammon Ranges is on par with the Victorian High Country. Yeah okay, it's reasonably easy by comparison to places like Coffs Harbour or the Glass House Mountains, but it's on par with the most scenic 4WD touring you'll find anywhere in the country and there's definitely enough action to give that 4WD itch a good scratch.

To start with, you'll need to cover a few hundred clicks of dirt roads to get out here which of course means you'll be hitting a few corrugations. The tracks out here are mostly rocky, steep in parts and drop down into plenty of mostly dry stony creek beds. Come out here at the right time of year and it'll be one of the most eye-opening experiences you'll ever have with your 4WD.

VEHICLE SETUP

We're talking about the outback folks, so when you pack you can

IT'S 100 TIMES MORE OF A 4WD ADVENTURE THAN THE FLINDERS

The Mt Jacob Back Track is definitely worth checking out as soon as you pull into Arkaroola. It's a short 13km loop a few kays out of the village that's guaranteed to give your transfer case a work out

safely assume you won't be doing much winching and you won't be needing 10 inches of lift. Instead, focus on things like water and fuel storage, having the right tyres and keeping them at the right pressures as the terrain changes.

These towns run on bore water which is generally not safe for drinking. That leaves rain water which can be in limited supply if it's been dry in the months leading up to your trip. It's best to work on carrying 5L/ person per day of travel and research where you can refill the tanks before you leave home. Oh,

and don't expect to attach a hose to fill up large water tanks. Most are limited to a jerry or two.

In terms of reliable, the best thing you can do to prepare your 4WD for a trip like this is make sure you've got quality LT (light truck) off-road tyres fitted. Whether they're all-terrains or muddies doesn't matter, just make sure they've got a strong sidewall because staking your tyres is your biggest threat out here. A tyre repair kit is also worth throwing in the back for the same reason.

Of course, the trick to reducing the risk of a puncture is

to get your tyre pressures right. We'd recommend dropping tyre pressures to around 28psi for the majority of dirt road driving, and then down to about 18psi once you pull off and start to tackle the low-range tracks. This'll allow your tyres to mould around sharp rocks and sticks instead of sustaining damage.

CRUNCHING THE NUMBERS

When you sit down to work out your fuel, food and water sums remember that you are going into the outback. It's best to work off 5L of water per person, per

day of travel and be aware that most towns only have rain water tanks to supply drinking water. Driving our 4.2L turbo diesel Patrol, we used an average of 15.8L/100km. You can fuel up and buy basic food at Arkaroola, Angorichina, Hawker, Leigh Creek and Yunta.

ARKAROOA

Arkaroola Village is a crackin' spot to set up base camp for a couple of days of exploring. Arkaroola's got fuel, basic supplies, mechanical and tyre repairs, camp grounds and even private 4WDing trails. There is

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FACT FILE

WHERE:

The Gammon Ranges is located 689km north of Adelaide or 134km east of Leigh Creek in South Australia.

From Adelaide take the National Hwy to Port Augusta, then on to Hawker. From Hawker either head north-east via Wilpena Pound and the Flinders Ranges to Blinman, or go north to Copley and take the Arkaroola Rd.

From Melbourne, head up the Calder Hwy towards Mildura then on to Renmark, Peterborough and Hawker. And from NSW take the Barrier Hwy towards Broken Hill and on to Yunta in SA, then head north up through Waukaranga.

CAMPING:

ARKAROOA: Full amenities including showers and toilets; powered and non powered sites available.

MAINWATER WELL: Basic bush camping, no facilities.

ARCOONA CAMPGROUND: Basic bush camping, no facilities.

GRINGELLS HUT: Basic facilities only including toilets.

WEETOOTLA CAMPGROUND: Basic facilities only including toilets.

ITALOWIE CAMPGROUND: Basic bush camping, no facilities.

You are required to pay a camping fee if staying within the Gammon Ranges National Park which costs \$11 per vehicle (up to 8 people). Camping at Arkaroola Village is priced from \$14 for a single adult and vehicle, or \$22 for a couple and one vehicle.

WHAT TO TAKE:

Ensure you have quality off-road tyres fitted, bring a puncture repair kit and lower pressures according to the terrain. Water storage is paramount as drinking water is limited, and the same applies with fuel. Do your sums before you leave home and carry a spare jerry just in case. Of course, a sat phone and a first aid kit should be considered mandatory for a remote trip like this.

BEST TIME TO TRAVEL:

May-July

FUEL & SUPPLIES:

Depending on the direction you're coming from, Yunta and Hawker will be the last towns with mainstream supermarkets and service stations. As you get closer to the Gammon Ranges, you can restock on basic food and fuel at Angorichina Village and the Arkaroola Village.

HAWKER

DIESEL: \$1.36/L

PETROL: \$1.48/L

TRIP STANDARD:

This trip is rated D, with A meaning only suited to vehicles with an extreme level of off-road modification and E meaning perfectly suited to all types of 4WD vehicles. Invest in two things before coming out here; adequate water storage and quality off-road tyres.

TRIP TIME OF YEAR

September

RESTRICTIONS AND PERMITS:

Dogs are not permitted in the national park, however, they are allowed at the Arkaroola Village. Fire bans are generally in place from the 1st of November until the 31st of March.

CONTACTS:

ARKAROOA WILDERNESS SANCTUARY

PH: (08) 8648 4848

W: www.arkaroola.com.au

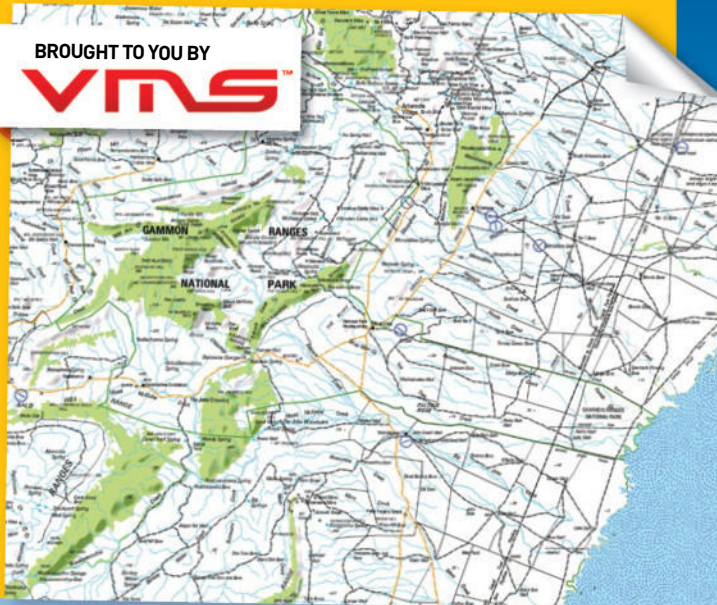
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PH: (08) 8204 1910

W: www.environment.sa.gov.au

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bush camping along a 5km stretch of a creek bed for those who enjoy the isolation of being the only camp in sight. If being closer to some amenities is more your idea of 'roughing it' there are unpowered and powered sites in the main camp ground, located on a hill with a

great view of the surrounding mountain ranges.

MAKE ANY EXCUSE TO GET OUT HERE!

Seriously, we shouldn't need to twist your arm with this one. What we've covered in these few pages barely scratches the

surface of the rugged adventure that's waiting for you out here. Even if you've been to the outback before, this truly is something different and you need to make any excuse to get out here to see it for yourself. **4WD**

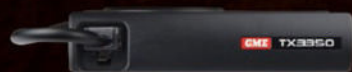


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▼ BIG BORE ADJUSTABLE SHOCKS

If you have a full-size 4WD with raised suspension and you carry heavy loads, tow, or just need superb control in any conditions, these shocks are unbeatable. The Tough Dog big-bore shock has a 70mm outer case, a whopping 45mm piston, and is ride-adjustable via an external 9-position knob. This specification provides real control and rapid dispersion of heat.

\$275 each. FREE-DELIVERY

▼ NITRO SHOCKS

Designed with control & comfort in mind. These shocks work well to provide you with a balanced, controlled, sway-free ride. The shock will automatically adjust itself to the road conditions to deliver a softer or firmer ride as the terrain dictates. So when you're around town and want a softer ride, you've got it! When you want your vehicle to perform off-road, you also have the control that you need. Priced competitively and excellent quality, these shocks are perfect for the light to medium 4WDs with leaf-sprung suspension.

\$125 each. FREE-DELIVERY

▼ FOAM-CELL SHOCKS

The winner of 4WD Action magazine's 19-page torture and comparison test. These shocks have a large bore (41mm) and are built for heavy-duty use and for coil-sprung vehicles. The use of a micro-cellular foam insert has produced a new breed of shocks, which are more resistant to fade. Provides more control than your regular 35mm bore product. These Tough Dogs are one of man's best friends.

\$160 each. FREE-DELIVERY

▼ COIL SPRINGS

Tough Dog coils are not available for Commodores, Falcons and Pulsars etc. The Tough Dog team's expertise is in 4WD suspension applications. And that is why no other coil spring brand can match the 'intelligent design' of the huge range of coils. They are available to suit may 4WDs from Daihatsu Feroza to mining-spec Toyotas and Nissans.

From **\$240 (pair) FREE-DELIVERY**

▼ TORSION BARS

Tough Dog torsion bars dramatically increase ride-quality and control as well as restore the spring action 'lost' via "cranking" the original units. Using the very best steel, these bars make your 4WD ride better regardless of how light or heavy the load on them.

From **\$250 (pair) FREE-DELIVERY**

▼ EXT STEERING DAMPER

Unlike cars, most 4WDs need a steering damper to control front-end shimmy and/or wide tyres that often seem to have a mind of their own, especially on back roads. The heavy-duty EXT has a larger bore size than most original dampers. This means more control, better handling and less driver fatigue. EXT dampers bolt up to the existing mounts, so fitment is easy.

\$120 each. FREE-DELIVERY

▼ RTC STEERING DAMPER

The award-winning RTC (return-to-centre) steering damper is one of our best-selling products. The coil-over design helps keep the steering centred; no matter the road surface or terrain. For extreme applications, there is a big-bore RTC damper to suit some Landcruisers, Patrols, and F250s.

\$165 or \$300 (big-bore version) FREE-DELIVERY

▼ LEAF SPRINGS

Tried, tested and proven in the harsh conditions of the Australian outback. Tough Dog springs provide the performance and long-term durability your 4WD demands.

Each leaf is formed to a template, oil quenched, hardened and tempered before being assembled. The spring is then scragged and load tested to ensure that the spring retains its height. Provides around 50mm lift and available in a range of designs depending on your load-bearing requirements.

▼ KING OF BIG KITS

Premium quality 4" (100mm) 5" (125mm) & 6" (150mm) suspension kits. For the serious off-road enthusiast who knows what's what! Kit includes 45mm Tough Dog adjustable shocks, Tough Dog coils, 3 degree castor bushes (or plates for 5-6" kits), adjustable panhard rods, transmission spacer (Patrol) and extended brake hose kit. Optional upgrades with spring rates, steering damper, abs compatible brake hoses, sway bar extensions or drop boxes.

▼ 'FAST-FIT' STRUTS

The new 'fast-fit' Tough Dog strut units make fitting a breeze. Instead of fitting the coil to the strut yourself, you buy the strut and spring already fitted together. No more struggling! Includes the Tough Dog coil design of your choice, upper spring seat and bearing plate, bushes and mounting hardware.

From **\$390 each. FREE-DELIVERY**

CHOOSE FACTS OVER FICTION



4WD Action magazine (#165) featured a 19 page torture and comparison test of the 10 best selling 4WD shocks. Tough Dog shocks "collared" the competition and were awarded 1st place, in a line up that included Koni, Bilstein, Old Man Emu, Ultimate, Raw and TJM.


4WD238 26

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THE LONG WAY ROUND



WORDS BY DANIEL REBER PHOTOGRAPHY BY WES WHITWORTH →

After owning a stack of tough vehicles this diehard 4WDer came full circle and found the 4WD he was destined for





"Yep – I've owned a couple of different 4WDs over the years," laughs Aaron when we asked about how he came to own this beast of a Defender. "Everything from a couple of Navaras, right through to my current project - a twin-locked, roll-caged FJ40 on 40in tyres, coilovers, oh and running a 351 Cleveland V8."

With a rig like that in the yard, you know a bloke's as passionate as they come about turning all four wheels on the dirt. So, there begs the question; when you've owned such an eclectic array of tough 4WDs, where do you turn when you want a tough, solid axle 4WD that's fit for longer distance trips? "With a duo of

young kids and a wife, we wanted to start doing some longer distance, touring style trips so we started looking for the right vehicle," explains Aaron. "It had to be solid axle, with plenty of space and had to be a proven performer when it came to the tortures of long-distance travel and be able to tow our soft-floor camper." Well, in June 2013 the family welcomed their newest addition – the immaculate 2013 Land Rover Defender you see before you. Of course it didn't roll off the production line in the same fashion you see it now – no. That part took a lot of nights in the shed, research and passion to sculpt!



GO-FURTHER GEAR

- 1000km fuel range from twin tanks
- Aftermarket intercooler, EGR delete and 3inch exhaust
- ECU remapping
- Twin Optima batteries with Redarc controller

Storage encompasses more than just the gear inside, if you can't carry more than a few hundred kays worth of fuel you're not going to make it as a remote tourer. "On top of the standard 75lt fuel tank, I've fitted a Brown Davis auxiliary fuel tank which together with the main tank gives me a 1000km range no matter what terrain I'm driving," Aaron says.

All that fuel heads to the standard 2.2L Puma diesel motor, which has retained the standard turbocharger, but now carries an aftermarket intercooler courtesy of Davis Performance. "I've fitted the engine with an EGR delete, custom 3in exhaust and had the ECU remapped to suit," Aaron says. From the motor the power is fed through the standard Land Rover clutch to the two diffs that are filled with Harrop's finest – twin E-Lockers! "The lockers are sensational and are probably the best addition I've made to the Defender, I can crawl any obstacle without the Landy even breaking a sweat!"

Keeping the engine fed with fuel is much the same as keeping all your 12V needs fed with power. For this, Aaron has fitted a pair of Optima D34 55Ah batteries – one for starting duties, one for auxiliary power needs. The two batteries are kept charged, conditioned and separated by a Redarc SB112 dual battery isolator which makes sure the Landy fires up the batteries of a morning.



A 3in exhaust, aftermarket intercooler and an EGR block let the Puma motor breathe with ease



Twin Optima batteries are stored under the seat for easy maintenance and their own protection

The twin E-Lockers really plow the Landy forward in tougher terrain that'd catch out lesser 4WDs



GO-HARDER GEAR

- Rovercraft and APT Fabrications steel barwork
- 235/85R16 BF-Goodrich KM2s on aftermarket alloys
- 2inch all-rounder suspension setup
- 9000lb winch
- LED driving and camp lights

Speaking of coping a beating, the last thing you want on any 4WD, but especially a brand new one is panel damage from errant wildlife, rocks or track obstacles. So, before the Landy ventured too far off the beaten track, some barwork was in order! "Up the front, I've fitted a Rover Craft steel, tubular bullbar which houses the Warn XD9000 winch – a lifesaver if we're on our own," says Aaron. "Down the sides are a set of APT Fabrication steel rock sliders and bringing up the rear is the standard Land Rover steel rear bar - for now." Also from APT is a front diff guard and up on the roof is a Wind Cheetah alloy roof rack for additional bulk storage. It's no secret; barwork makes the perfect platform for mounting lights and other gear, and in this case Aaron has mounted a 9000 lumen Narva light bar to the front bar and a Jaycar LED floodlight for setting up camp after dark.

"I wanted to build a touring vehicle that was not only reliable on remote trips, but could also tackle tougher obstacles without the risk of leaving us stranded in the middle of nowhere," Aaron says. It was with this build philosophy that Aaron got stuck into sorting the Landy for a long life of incredible adventures ahead. One of the first cabs off the rank was getting the suspension sorted so Aaron could get some meatier tyres under the guards. "Having used Tough Dog gear in my 4WDs previously, I had no issue giving them the nod for the Defender. I've gone for 2in, heavy-duty coils, backed up with 41mm bore foam-cell shocks in both the front and rear," Aaron explains. "The lads at Opposite Lock Narellan fitted the gear and I must say I'm very happy with the results, although some swaybar disconnects are on the cards to free up the articulation somewhat – but that's down the line." With the newfound space under those guards Aaron was able to fit a quality set of tyres, in the form of 235/85R16 BF Goodrich KM2s wrapped around the factory 16x7in Boost alloys, which are more than capable of coping a beating.



The tubular steel front bar mounts the WARN winch and Narva lightbar perfectly and gives excellent access to the winch clutch



Airbags in the rear springs assist with heavier loads associated with long distance touring

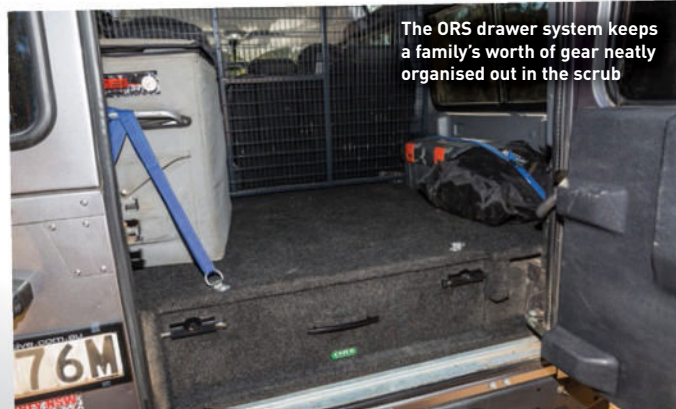
INTERNAL MODS

- ORS drawer system
- 40L and 80L fridges
- ICOM UHF setup

Having all the right gear on the outside is great, but having the right stuff on the inside is just as important for a long-range touring vehicle. What might seem like gadgets to the uninitiated, are absolutely essential once you get beyond the black stump. Aaron realised pretty early in the piece that there were certain bits of kit that would not be lacking in his 4WD. Inside the cabin there's an ICOM IC-440N UHF that keeps Aaron in contact with the convoy or nearby 4WDs while out in the bush. "I've also fitted an ORS drawer system in the back, which is a lifesaver for organising a family worth of gear on long trips and on top of these is a 40L Engel used as a freezer and an 80L Engel used as a fridge," explains Aaron.



In-cab winch controls and locker buttons are in close reach of Aaron



The ORS drawer system keeps a family's worth of gear neatly organised out in the scrub

RUNDOWN

ENGINE: 2.2l turbo diesel

Puma motor

GEARBOX: 5-speed manual

4WD ACTIVATION: Part time with manual locking hubs

SUSPENSION: 2in Tough Dog coils and 41mm TD foam cell shocks

TYRES: BF Goodrich KM2 - 235/85R16

OTHER GOOD GEAR: ICOM UHF, HEMA HN-5 GPS, APT diff guard and side rails, Brown Davis aux fuel tank, Harrop E-Lockers front and rear, Hurricane exhaust system





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KAKADU ICONS

WORDS BY GEOFF MARTIN PHOTOGRAPHY BY GEOFF & DENISE MARTIN



The iconic and spectacular Jim Jim and Twin Falls in central Kakadu are only accessible via 4WD. Here's how you get to them...

REAL 4WDING

KAKADU NATIONAL PARK NT



WWW.4WDACTION.COM.AU



Two of Kakadu's most spectacular attractions are Jim Jim Falls and Twin Falls, especially in the wet season when water roars over the 150m cliffs. At that time of the year these falls can only be viewed from air. However during the dry season the falls reduce enough for the tracks to re-open making access possible. The gorges and falls are incredibly spectacular even with the dry season flows, and the other good thing about these locations is that they are only accessible via a high clearance 4WD which is the way we like it!

We'll start this trip at Yellow Water Billabong, Kakadu's most famous wetland which is located at the end of Jim Jim Creek that flows into the South Alligator River. This river system, which is the largest in Kakadu, contains extensive wetlands that include river channels, floodplains and backwater swamps. The only way to really see this area is via boat, either your own or the famous Yellow Waters Wetlands Boat cruise. There are several cruises each day, with the early morning cruise (which includes breakfast) or sunset cruise the pick of the bunch. From a boat you will see plenty of birdlife and animals as well as some very big crocodiles! The fishing is also excellent here,



Impressive Aboriginal art in the Nourlangie area



Don't underestimate the 900m walk; it's tough as Alan would testify



The track to Jim Jim winds past the spectacular ranges

with good size barramundi regularly caught when the conditions are right. The Gagudju Lodge Cooinda is great if you're looking for a resort style accommodation or a campground with full facilities, with the national park campground at Mardugal a good option if looking for a more basic spot.

From Yellow Waters its 6km back to the main Kakadu Highway then another 6km to the turn-off to the Jim Jim Falls area.

The road from Kakadu Highway to the camping area is a wide maintained gravel road that stretches for 60km. There are corrugated patches and usually plenty of dust so watch out for on-coming vehicles, particularly ones in a hurry. Not all that long ago it used to be a rough 4WD track that would take over two hours to transverse – that's progress for you! It still is a very scenic drive however as you approach and drive along the escarpment – particularly late in the afternoon when the surrounding ranges light up brilliantly.

Once at the Jim Jim camping area (now called Garnamarr) pick out and reserve your place even if you arrive in the morning as it can get quite busy. It's worth catching up with the campground

manager who can fill you in on the road conditions and sell you shuttle boat tickets for the Twin Falls cruise (the only way to access Twin Falls – more on this later). The campground is quite good with shady areas, firepits, and amenities that include solar hot showers.

Right at the campground the road ends and the track to the falls is protected by a gate. This gate is locked at night to prevent people camping overnight nearer the falls. Once through the gate the track becomes narrow with plenty of sandy patches and some creek crossings. After 9km you come to a fork in the road with Twin Falls to the right and Jim Jim Falls to the left. We'll continue to the left to Jim Jim Falls carpark, which is only another 1km.

The walk from the carpark to the plunge pool at the bottom of Jim Jim Falls is only 900m long but don't underestimate it. The 400m is easy enough to the viewing pool which you get your first view down the gorge to the



Shady spacious camping spot at Cooinda Lodge

falls and it's fantastic. Great spot for a photograph before tackling the more difficult second stage which involves scrambling and rock hopping over boulders. These are often slippery with sand so take extra care. We came across a gentleman who had slipped and put a large gash on his hand that would have needed a large number of stitches to repair.

The closer you get to the end of the gorge the more impressive

it gets! This is one massive cliff face. The plunge pool is enclosed on three sides by vertical cliffs and is huge. Jim Jim Falls (Aboriginal name Barrkmalam) descends from the an elevation of 259m above sea level via one drop that ranges in height between 140m and 200m.

The water doesn't see much sun so is refreshing (well pretty cold actually). A better option for a swim is the other pool back a little, that has a nice white sandy





Nothing like cooking up a storm out in the middle of nowhere!

beach and is much warmer.

It is believed that 140 million years ago much of Kakadu was under a shallow sea. The prominent escarpment wall formed sea cliffs and the Arnhem Land plateau formed a flat land above the sea. Today the escarpment, which rises to 330m above the plains, extends over 500km along the eastern side of the national park and into Arnhem Land. It varies from vertical cliffs in the Jim Jim Falls area to stepped cliffs in the north.

For the more adventurous there is a walk to the top of the falls which provides panoramic views across the valley below, as well as providing views of the upper falls which cannot be seen

from the valley floor. This walk is called the Barrk-Marlam and it is a difficult 6km walk starting with a very steep climb up the escarpment. Once up the escarpment the walk is a relatively easy stroll amongst bushland. Allow 4 to 6 hours return for this walk, and walkers should wear appropriate walking attire and carry plenty of water as it can get very hot on the plateau. Hence early morning is the best time to tackle this walk. Try to make time to do this walk as the views from the top are just spectacular!

From the Jim Jim carpark it's 1km back to the intersection then continue to the left towards Twin Falls. From here it's 10km to the Twin Falls gorge.

After 1.5km you come to the old camping area that is now a picnic area and then comes the biggest challenge on the track – the crossing of Jim Jim creek. This concreted crossing can be quite deep especially early in the dry season with a depth around 1m, so a snorkel is highly recommended. It is also not a creek to walk as saltwater crocodiles are prevalent in the area – need to keep away from those snapping handbags! After the excitement of Jim Jim creek the track meanders through bushland before arriving at the Twin Falls carpark.

Twin Falls gorge is stunningly beautiful and now much easier to access. Back before 2004 the only way to access the gorge was by swimming several hundred metres upstream against the current, but now a shuttle boat takes you up to the walking track to the base of the falls. Tickets are required for the shuttle boat and these can be purchased from the Jim Jim campground manager or from the Bowali visitor centre in Jabiru. Don't make the mistake of arriving at Twin Falls without tickets and missing out on viewing the gorge and waterfall.

Before the boat shuttle a net used to be placed across the creek in the dry season to

prevent crocodiles heading up there and allowing people to swim. However a large crocodile was once found on the wrong side of the net and when rangers attempted to trap this crocodile it dived through sand under the net and escaped. Obviously the net wasn't working and abandoned, with swimming now banned and the boats providing access to the falls.

From the boat drop-off point it's a short walk with some rock-hopping to the sandy beach and spectacular twin falls waterfall. Great spot for a photograph and to take in the beautiful surrounds, but with no swimming it's not a place to linger for too long. But there is an alternative – take the longer walk from the carpark to the top of the falls where you can swim and take in the breathtaking views into the gorge below.

Returning from Twin and Jim Jim Falls stay overnight at the campground and make sure you're back in time to watch the surrounding hills ignite with the setting sun perhaps while relaxing with a cool beverage after a great day 4WDing and walking in one of the most spectacular places in Australia.

The Twin and Jim Jim Falls area is worthy of several days



Relaxing at the Jim Jim campground after a busy day exploring



Driving the 4WD track to Jim Jim and Twin Falls

– try to allocate a day for each if you can afford the time.

From the Jim Jim campground drive back to the Kakadu Highway turning right and then travel 12km to the Muirella Park turn-off on the right.

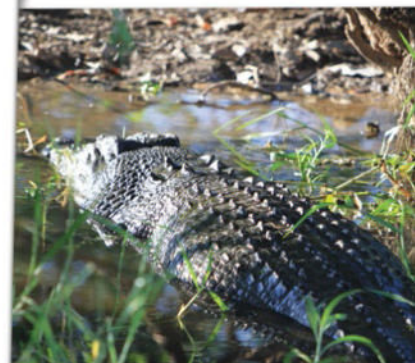
Muirella Park is a large campground adjacent a billabong which is a great place for fishing and perhaps even a decent (legal) size barra-mundi. There is a ramp for launching your boat, and the amenities even include solar showers. Another option is to camp at Sandy Billabong, which is 6km further on along a 4WD only track to a basic campground adjacent the billabong. This is another popular fishing place as well.

Heading back to the highway it's another 7km to the turn-off to the Nourlangie area. This area is famous (and popular) for its Aboriginal art at Nourlangie rock which is only a short stroll on well-formed paths from the carpark. Leaving Nourlangie rock it's worth stopping at the scenic Anbangbang billabong with the pretty billabong framed by Nourlangie rock making a great spot for lunch or a cuppa.

Back to the Kakadu highway it's 19km to the Bowali Visitors Centre on the outskirts of Jabiru. The visitors centre is a great place to learn about Kakadu with extensive displays, videos, information sheets, friendly staff to help, and café & gallery. The whole visitors centre is a work of art itself, with every detail of



The deep crossing of Jim Jim Creek



Large crocodiles abound in the Yellow waters area



The spectacular Twin Falls



FACT FILE

WHERE:

This trip covers the iconic attractions of the Kakadu National Park including Jim Jim and Twin Falls, which is located in the Top End of the Northern Territory.

CAMPING:

There are national park campgrounds at Garnamar Camp (Jim Jim Falls), Mardugal Camp (Yellow Waters), and Muirella Park (Nourlangie area) with firepits, shower & toilet facilities. Sandy Billabong has firepits with long-drop toilets.

There are commercial campgrounds at Gagudu Lodge Cooinda and Kakadu Lodge Jabiru if looking for a little more luxury, with the price tag to suit.

WHAT TO TAKE:

Limited food and drink supplies are available within the Kakadu National Park so take appropriate food and drinks for your planned stay. In particular, there are strict rules regarding alcohol purchase so stock up before entering the park. There is only limited mobile phone coverage so it is prudent to also carry a satellite phone.

SUPPLIES AND FACILITIES:

Jabiru is the major town within Kakadu and has a well stock supermarket as well as fuel and other supplies.

Cooinda Lodge has basic supplies and fuel available.

If possible stock up at one of the major centres on the outskirts of the park such as Katherine or Darwin suburbs which have all the services such as supermarkets, fuel outlets, mechanics, and even 4WD accessory suppliers.

TRIP STANDARD:

Trip rating A through to E grade, with E meaning a 2WD could do the trip, and A requiring a lift, lockers, a winch and aggressive tyres to complete.

The main access roads are bitumen and graded gravel which are maintained regularly. Rating E.

The track to Twin Falls includes a deep crossing of Jim Jim creek and some sandy sections requiring a high clearance 4WD. Rating D.

Sandy Billabong is accessed by 4WD only. Rating D.

MAPS AND GUIDES:

HEMA Kakadu National Park

CONTACTS AND INFORMATION:

KAKADU NATIONAL PARK

BOWALI VISITOR CENTRE

PO BOX 71 JABIRU NT 0886

Phone: (08) 89381120

Website: www.environment.gov.au/parks/kakadu

KAKADU TOURISM (CRUISES AND TOURS)

Phone: 1800 500 401

Website: www.gagudju-dreaming.com

Twin Falls shuttle service \$12.50 pp (U16 free), including the return journey. The service departs at least every half hour (depending on demand) from 7.30am until about 6pm.

FUEL:

(At time of trip)

COOINDA: Diesel \$1.45 Unleaded (Opal) \$1.50

JABIRU: Diesel \$1.53 Unleaded (Opal) \$1.62

ROAD CONDITIONS:

The road conditions were generally good at the time of the trip, with the main access road to Jim Jim area recently graded. The 4WD track to Jim Jim and Twin falls was also in good condition with only a few sandy areas causing concern.

RESTRICTIONS AND PERMITS:

Kakadu National Park requires a parks pass that can be purchased from several outlets within the park including the Bowali Visitors Centre and Cooinda Lodge.

BUDGET ATTRACTIONS:

Budget attractions include bushwalking, photographing the magnificent scenery, fishing the rivers and billabongs, swimming and snorkeling in the spectacular gorges, or just relaxing at the campsites or within the gorges.

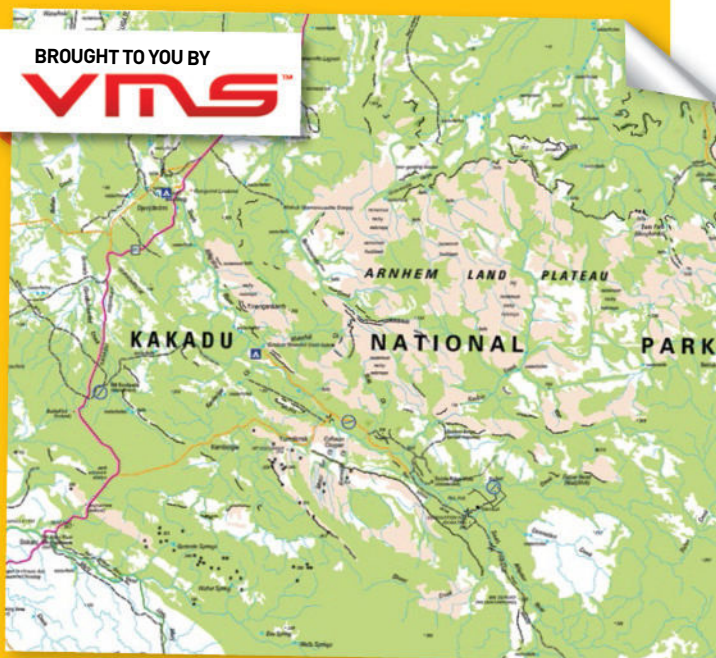
BEST TIME TO TRAVEL:

The dry season (April to November) is the best time to travel, as most of the tracks are closed during the other months. Check road conditions and track openings prior to travelling.

TIME OF TRIP: May

BROUGHT TO YOU BY

VMS



the building lovingly crafted. Jabiru is only a short drive further on, and a good place to fuel up and replenish your supplies.

From Jabiru it is 48km north on the Oenpelli Road to Ubirr, famous for its rock art and views across the floodplains. The views from the lookout across the Nardab floodplains and into Arnhem Land escarpments are spectacular, especially at sunset.

The big attractions of Kakadu such as Twin and Jim Jim Falls and the surrounding area are well worth visiting especially since you can only access them with a 4WD. Take the time to explore and experience this area as it is one of the premier and iconic locations in Australia.

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SHORT 'N STOUT!



WORDS BY DANIEL REBER, PHOTOGRAPHY BY WES WHITWORTH →

What made a devote
HiLux owner throw it
all in to build one of the
toughest shorty Patrols
in Australia?




- 650Nm of torque
- Twin locked GU diffs
- Long range tourer



It's not often that you'll come across a bloke so dedicated to the 4WD lifestyle as Alex Chalmers – and how could you blame him? "I used to get out there every weekend with mates in my HiLux, and the old rig did well and taught me a lot," says Alex. "More and more however, I started to see blokes out there in short wheelbase Patrols, and after seeing what those things could do, I decided right then and there to get a shorty in my driveway," says Alex.

It hasn't been a build without hurdles however, but with perseverance and a 'think outside the box' attitude, Alex's rig is now not only a local legend, but also immortalized in these pages as one of the best shorty Patrols we've ever seen (sorry Graham).

Without further ado, make some space in the shed, get comfortable and check out the rig that's going to have you hunting down your very own shorty! 



EXTERIOR

- Cheezy Racing steel comp spec front bar w/12,000lb winch and in-cab controls
- Cheezy Racing steel comp spec sliders
- Cheezy Racing steel rear bar with dual tyre carriers
- 4in Millweld stainless steel snorkel modified to clear roof rack
- Shortened ARB premium alloy roof rack
- Rear quarter panel chop and braced front inner guards to prevent cracking
- 22in and 42in LED lightbars

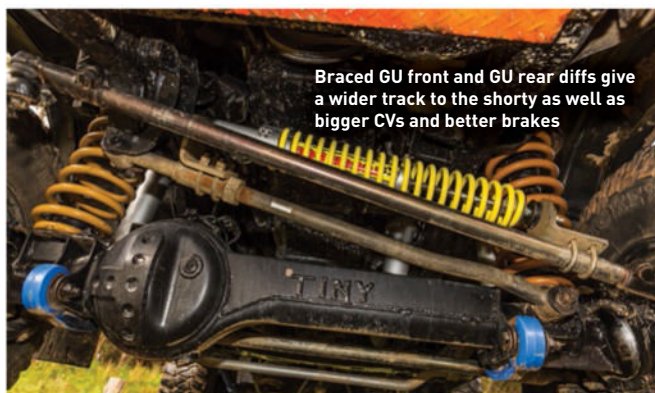
"Overall, I'm very pleased with the barwork on the Patrol, the front bar offers great strength and angles, although I feel it could improve on the strength of the mounts themselves – nothing a welder can't fix," says Alex. "The Millweld snorkel had to be customised with a forward facing head to clear the roof rack, but other than that it's all been straight forward."



**IT'S JUST AS AT
CAPABLE IN THE
SIMMO AS IT IS
IN COFFS**



The 80L water tank resides behind the ARB fridge and MSA fridge barrier

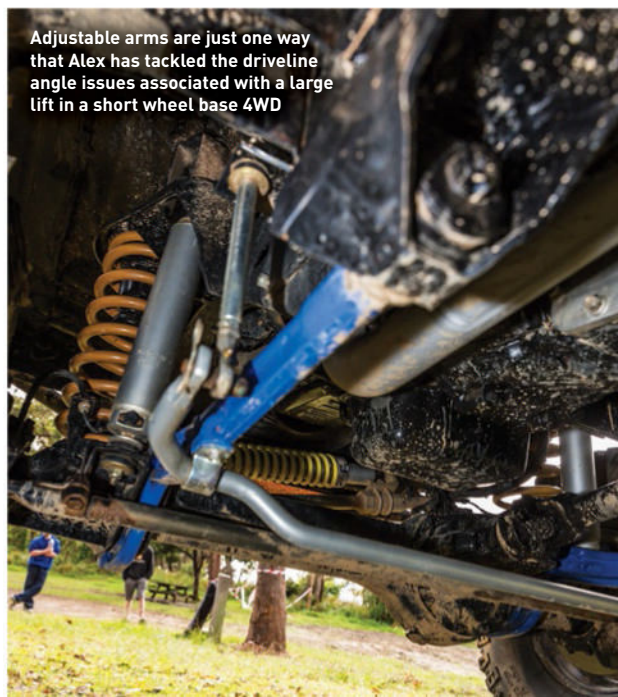


Braced GU front and GU rear diffs give a wider track to the shorty as well as bigger CVs and better brakes

SUSPENSION, WHEELS & TYRES

- 6in Tough Dog heavy duty coils front and rear w/30mm coil spacers
- 8in Tough Dog adjustable big bore shock absorbers
- Tough Dog RTC steering dampener
- GU Patrol steering box
- Superior Engineering comp spec steering rod and drag link
- Snake Racing upper and lower rear control arms
- Superior Engineering Super Flex swaybars
- Superior Engineering coil drop out cones and coil retainers
- King steel wheels 15x10 -44 offset
- Mickey Thompson MTZ - 35x12.5R15

"Being such a big lift in a shorty, tail shaft angles have always been a challenge," says Alex. "I've tried high pinion rear diff centres, adjustable arms, double cardan tail shafts none of which have completely worked for me so I'm using gear box spacers which aren't ideal but they're doing the job for now. Busting units is actually such a common occurrence that I keep a full spare tailshaft under the rear bar!"



Adjustable arms are just one way that Alex has tackled the driveline angle issues associated with a large lift in a short wheel base 4WD

INTERIOR, 12V & TOURING GEAR

- Redarc BCDC1240 40Amp DC-DC charger
- Discover Energy 120Ah AGM and 730cca starting batteries
- ARB Paratus seats
- Redarc EGT, boost, intercooler in/out temp and water temp gauges
- Piranha battery monitor
- HEMA HN7 GPS
- GME UHF and Bury mobile cradle and antenna
- 78L ARB fridge and MSA drop slide w/fridge barrier
- Outback roller drawers modified from Falcon ute for extra length
- 150L long range fuel and 80L water tanks
- 6mm bash plate around fuel tank
- Full sound deadening inside and 1.6mm checker plate interior trims
- ARB twin motor air compressor

"The sound deadening inside has made a huge difference to the overall noise in the cabin, which is great on long trips," says Alex. "Overall I used two bulk packs of Dynamat to cover the whole interior from barn doors to firewall, which cost around \$400 all up - I'll do it to any and every 4WD I own in the future."



The interior has been fully sound deadened with Dynamat and re trimmed with 1.6mm sheet



***TINY IS CURRENTLY
PUMPING OUT
OVER 190HP AND
650NM OF TORQUE***

WORDS FROM THE WISE

"Building Tiny really proved that you don't need to settle for off the shelf parts if they aren't exactly what you want," says Alex. "Don't be afraid to get your hands dirty and build or modify parts to make the truck exactly what you want it to be."



ENGINE AND DRIVELINE

- TD42 fully rebuilt
- Low mount ceramic coated Safari turbo manifold and GT2863 turbocharger running 25psi
- GU Patrol airbox
- Turbosmart Boost Tee boost controller
- Diesel Central DC6 12mm boost compensated injector pump
- 600mmx300mmx76mm eBay front mounted intercooler
- 8psi electric fuel pump and twin fuel filters
- 3in exhaust system
- Excedy Safari Tough clutch
- Eaton E-Lockers front and rear
- GU Patrol diffs (full housing) front and rear, braced front w/4.3 diff gears
- GU Patrol brakes

"I killed my original Safari turbo when I upgraded the fuel pump, which just pushed it beyond its limits so I chose the GT2863 because it's still small enough to spool quickly and provide good response," says Alex. "I had it retuned recently by Diesel Central in Rockhampton and Tiny is currently pumping out over 190hp and 650Nm of torque. The biggest surprise came from the universal eBay intercooler; it's not uncommon to see a 100 degree drop in air temp between in the inlet and outlet of the intercooler – it works an absolute treat." Alex also fitted an 8psi electric fuel pump to assist the injector pump and provide much smoother acceleration and help with fuel surge on steep angles in the long range tank.

POWER OUTPUT!

POWER: 190Hp
TORQUE: 650Nm

With a fresh rebuild, the TD42 is cranking out big but reliable horsepower



RUNDOWN

ENGINE: TD42 – 4.2L inline six cylinder diesel with aftermarket turbo and intercooler

GEARBOX: 5-speed manual and Safari Tough clutch

4WD ACTIVATION: Part time w/ manual locking hubs

SUSPENSION: 6in Tough Dog coils and 8in Tough Dog shocks

WHEELS: 15x10in -44 King steel wheels

TYRES: 35x12.5R15 Mickey Thompson MTZ





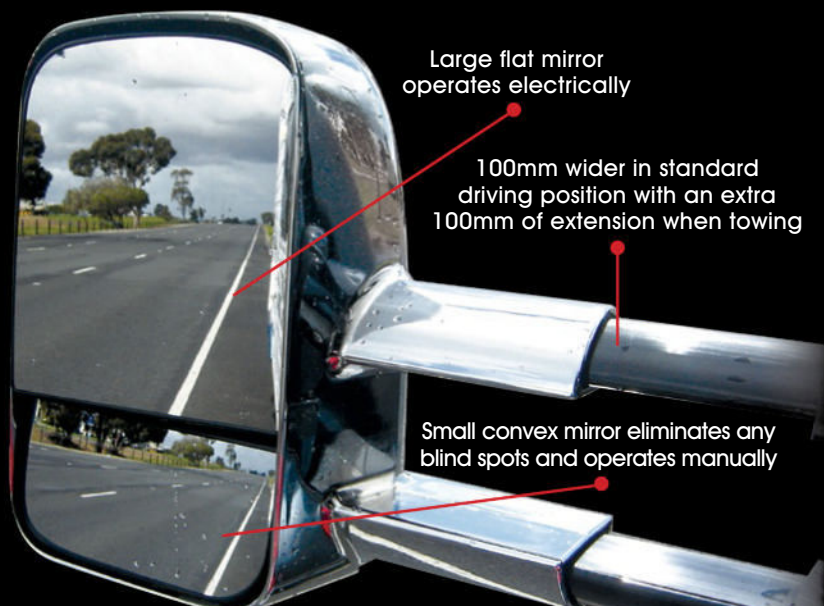
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LIVING THE DR





TEAM

Part 2

WORDS AND PHOTOS BY DEAN DAL SANTO AND REBECCA SIMPSON-DAL SANTO



We re-join Dean and Rebecca on their epic lap around Australia as they head up through NSW to Fraser Island and then over to the Simpson Desert





Three icons on the edge of the Simmo – Big Red, Birdsville and the mighty Patrol!



Camels are common surrounding the Simmo so take it easy on high speed tracks



While you're driving on Fraser be mindful of the animals that call it home. Keep to the speed limits and be aware of the beach ahead of you



You don't need an expensive set up to do the big lap; we used plastic tubs for storage and an Oztent and awning for shelter

HEADING NORTH

Leaving the High Country, make your way north to enjoy the warmth and sunshine in Queensland but before you get your sand in between your tread there's plenty to see and do. In fact, the only plan for our 13 month trip around Australia was 'don't get stranded in the wet'

The NSW south coast and hinterland has a huge amount of 4WDing and pristine camping so you'll be spending your days lazing on beaches or getting lost in the Deua National Park. A fantastic reminder to always have paper maps as backup – our GPS gave us a total bum steer along fire trails 100km from where we had wanted to be. Try and get yourself to Mongamula Firetrail where you'll find one of the best

campsites in the area.

One thing that you'll notice if you're doing the big lap is how quickly you'll adapt to not seeing other people and 4WDers for days at a time – it's a big shock coming from Tassie, the Vic High Country and south coast of NSW into the Blue Mountains but it's worth it if you've never been. The views are stunning and there are some amazing river-side camps to be found.

MECHANICAL REPAIRS ON THE GO

Undertaking any 4WDing trip you need to be prepared for anything and we experienced our first mechanical dramas in the New England National Park. Exploring the area for hours we were unlucky that a massive stick punctured the radiator. If you're carrying epoxy putty you might be able to stem the flow, but still we limped into Armidale for proper repairs. We pulled into town on a Saturday arvo and nothing was open so we wrote a quick note that we were stranded in town, slid it under TJM's door and waited. First thing Monday morning they managed to replace our radiator and called every mechanic in town to help us with our leaking headgasket till they found someone who could squeeze us in. Total champions, we were so appreciative. By and large the 4WD community will do anything



BE PREPARED FOR ANYTHING

You've probably never through about the battery in your key, but if your 4WD has an immobiliser it's something you don't want to go flat while you're travelling remote. It happened to us on Fraser and it was an expensive tow-truck trip to the ferry, then we had to find a locksmith to code a new key. If you haven't ever changed your key it'd be worth getting a new spare or refreshing your main key with a new battery before your big trip.

to help you out while you're on your lap, it's awesome.

THE SUNSHINE STATE

Finally over the Queensland border, you have to head straight to the beach and set up camp at Inskip Point. Having a fire on a warm night, eating fresh pineapple and looking out to Fraser Island to see 4WD headlights as they drive the beach will etch memories into your mind that you'll never forget. Get up early and get the ferry to maximise the time you'll get to drive up and down the beach, it's a fantastic feeling.

If Fraser is your first time camping near dingoes, make sure you keep all food and dishes in the car, you'll quickly realise that dingoes will steal damn near anything including empty water bottles, thongs and everything that looks remotely interesting to them. Feeding the dingoes is a big no-no on Fraser and you can get fined for doing so. Most of them may look tame, but don't be fooled as they are wild predators. Don't be like the backpackers we saw that tried to bait dingoes into posing for selfies with them...

FUN ON FRASER

Coongul Creek and Awinya Creek are both awesome camping spots on the west beach. You can drive along the

beach from one to the other, or you can take the inland track from Coongul to Awinya, which has a deep water crossing through Awinya Creek to get to the camping area.

Now we have a snorkel and we'd done plenty of river crossings in the High Country. Nothing to worry about, right? Wrong. The engine died in the middle of the creek, the water was over the bonnet and quickly rising around our feet. The trees are scrubby and too small to winch from so luckily a bloke came around the corner in his HiLux and offered to get us out.

After any problems it's worth getting your 4WD professionally checked out so we stopped in Gympie to make sure there was no damage from the salt water drowning. After that it's back in the driver's seat to head towards the desert. The Simmo



The Maheno Wreck is a highlight of Fraser, but grab your photo and get a move on as there is so much more to explore



Sunsets in the Simmo are spectacular



and particularly Munga-Thirri is by far one of the best places you'll ever camp at. The sunsets, silence, the beauty of the desert and of course the awesome 4WDing up and down the dunes. You'll be hooked by the red dirt and in the Simmo you'll be planning your next trip as soon as you leave. Dean was pretty stoked to drive up Big Red, the tallest dune in the Simpson, in one go. We just won't tell anyone it took five goes to get up Little Red then!

Birdsville is the closest town to Big Red and the eastern side of the Simpson and you've no doubt heard a lot about the iconic pub



DAILY CHECKS

An inspection of the engine reminded us how important it is to check your vehicle every day. Two of the clips on the air box had vibrated off, probably due to the corrugated tracks we'd driven and the seal around it had petrified. Lucky two 4WDs full of fellow Victorians turned up and we started on a three hour mission of drying out the engine and having a couple cold drinks. Turns out that water pistols are pretty useful for sucking water out of the engine!



THE TALLY SO FAR

KILOMETRES: 15,637

DAYS: 129

CAMPSITES: 82

BUDGET: \$11,956

COLDEST NIGHT: 0 (Mongamula Firetrail)

WARMEST DAY: 27 (Black Rocks camp at Bunjalung NP)

FACT FILE

WHERE:

This trip begins at Jindabyne and takes a mostly coastal route through NSW to the QLD border. From there, it heads to Fraser Island. Back on the mainland we headed directly west towards the Simpson Desert Munga-Thirri via Cameron Corner.

INFORMATION:

Fraser Island is Australia's largest sand island and also has freshwater inland lakes, rainforest areas and the purest breed of dingoes. Vehicle and passenger ferries leave from Inskip Point and River Heads on the QLD coast. Located about 30kms out of Birdsville, the Simpson Desert Munga-Thirri is a large, dune desert. Driving up the iconic Big Red, the highest sand dune in the desert, is an absolute must. UHF channel 10 is recommended for use through the Simpson.

CAMPING:

On Fraser, we camped at Wongai, Awinya Creek and Coongul Creek. Camping on the western side of the island is quieter and less windy than the eastern side. The beach camping on Fraser has no amenities and fires are prohibited. Camps at Dundubara and Waddy Point have amenities and do allow fires. There are no designated camp spots in the Simpson Desert. All national park camping areas in QLD have the same fee of \$5.95 per night per adult. Camping must be booked online, over the phone or at parks office – reception is non-existent in the Simpson and much of Fraser, so it's best to organise camping permits at parks offices.

In between Fraser and the Simpson, we also camped at Inskip Point.

WHAT TO TAKE:

We always carry enough food and water for at least a week, as well as two spare jerries of diesel. It's recommended to allow seven litres of water per person per day in the desert. Tyre deflators and inflators and mechanical spares are vital pieces of equipment to be carrying.

BEST TIME TO TRAVEL:

Travel on Fraser is comfortable all year round. In the Simpson and outback, travel is best during the winter months as this is the dry season and the temperatures are mostly comfortable. There is no access into the Simpson between December and March due to extreme temperatures.

FUEL & SUPPLIES:

Stocking up on food, water and fuel is best done at Gympie before heading to Fraser. Water, food and fuel are available on Fraser, but it's expensive. Birdsville has all supplies available, but we stocked up as we passed through Cunnamulla and St George along the way there.

TRIP STANDARD:

Overall this trip rates as C to B level – moderately difficult 4WDing that shouldn't cause any problem if you're prepared and familiar with 4WDing techniques.

Driving along the beaches on Fraser is tide-dependent and tide charts are widely available from parks offices. Simpson Desert and Munga-Thirri National Park requires high clearance. Lowering tyre pressures is vital for a successful crossing – 18-20psi is recommended. Birdsville Roadhouse and Mt Dare Hotel websites keep up to date information on track conditions and closures.

RESTRICTIONS AND PERMITS:

A Desert Parks Pass is required for driving in the SA section of the Simpson, these are available online and from Mt Dare Hotel. Sand flags are now required for all desert driving. It's recommended to take a sat phone – these are available for hire from the Birdsville info office and Mt Dare Hotel.

A driving permit is required for Fraser Island and can be purchased from parks offices. There are speed limits of 80kms along the beach and 30kms along inland tracks. Feeding the dingoes on Fraser is a serious offence that attracts fines and/or jail time. It's worth noting that RACQ do not service off-shore islands like Fraser (as we found out when we called them for help!)

CONTACTS:

NSW NATIONAL PARKS AND WILDLIFE

PH: (02) 6574 5555

QUEENSLAND PARKS AND WILDLIFE

PH: 13 74 68

SA PARKS AND WILDLIFE:

PH: (08) 8204 1910

FIVE RATS (FRASER ISLAND VEHICLE RECOVERY AND TOWING SERVICE)

PH: 0428 353 164

BIRDVILLE ROADHOUSE

PH: (07) 4656 3226

MT DARE HOTEL:

PH: (08) 8670 7835



and bakery. Both are definitely worth checking out! The bakery is famous for its curried camel pies, scoff one down then buy the sticker to prove it.

WHERE TO NEXT

Leaving the Simpson, we're heading down to check out South Australia and the south of Western Australia finding some epic river side camping and plenty of 4WDing!



The fun starts...



...where the bitumen stops!



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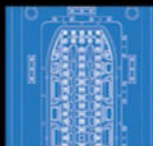


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by a genuine two year
manufacturers
warranty.



**COOL
COLOURS**
Everybody knows
those orange
things on 4WD's
are MAXTRAX but
we also offer a
variety of colours
to match your
vehicle or your
mood.



WWW.MAXTRAX.COM.AU



OUR BIGGEST EVER

DIESEL PERFORMANCE GUIDE

**\$1000s
OF EXCLUSIVE
DISCOUNTS
INSIDE**

This massive diesel guide puts you inside the industry to see the latest and greatest in diesel technology. Find out the best ways to set up any truck and get exclusive special deals on industry leading products, no matter what diesel 4WD you own or what your modification budget is.

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Shorty has toured all over Australia in extreme weather and harsh terrain. Graham uses Engine Armour Diesel to ensure the big turbo diesel is in tip top condition

ENGINE ARMOUR DIESEL

Oil designed specifically for high performance and hard working diesel engines

Valvoline is the world's first registered lubricant brand, and this year they're celebrating their 150 year anniversary – but that doesn't mean they're stuck in the past. Valvoline utilise their long history and experience to constantly innovate and engineer oil that will stand up to today's tough requirements. Available in over 140 countries around the world, Valvoline products are constantly real-world tested by 4WD owners in every condition possible. As modern diesel engines continue to evolve, so too does Valvoline's range of oils to match.

Engine Armour Diesel is a completely new range of oils designed specifically for hard working and high performance diesels. Using synthetic technology, Engine Armour Diesel offers superior protection for engine components while controlling soot, improving engine durability and keeping your engine clean. Whether you use your 4WD as a

stop-start daily driver or you're tackling the hot and harsh conditions of the Top End, the advanced additives and synthetic technology in Engine Armour Diesel protects your engine and components better than conventional oil working to minimise wear and extend the life of your engine.

It's important to select the correct oil for your 4WD and the conditions you drive in, so Valvoline has engineered two different viscosities of Engine Armour Diesel. The 5W-40 is ideal for modern 4WDs and 15W-50 is suited to older 4WDs with higher mileage. Check with your manufacturer and consider the main conditions you'll put your 4WD through, then choose the Engine Armour Diesel that'll best protect your engine.

Engine Armour Diesel is available in five and ten litre containers, so you're able to throw some in your 4WD for emergencies and stock enough in your shed for your next oil change.

WHY YOU NEED IT

- Formulated with synthetic technology to protect engine components better than conventional engine oil
- Advanced additives provide optimum performance and protection for diesel engines
- Promotes soot control, engine durability and engine cleanliness to protect and prolong engine life



VALVOLINE

PH: 1800 458 237

W: www.valvoline.com.au



SPECIAL OFFER!

Free fuel lines and 'Diesel Smoke Makes Me Broke' Baileys shirt and hat with any high flow injector set purchase – just mention the 4WD Action Diesel Performance Buyer's Guide.

Available until 31/03/16 or until stocks run out.

BAILEYS DIESEL GROUP

HIGH PERFORMANCE COMMON-RAIL KITS

More than double the horsepower and torque of your common-rail turbo diesel 4WD with this simple bolt-on kit

WHY YOU NEED IT

- The only custom high flow injectors available that are fully coded, rebuilt and come as new
- Easy way to unleash the hidden power from your common rail diesel
- Fit and tune on-site using only the best components including ECU-shop tuning modules

If you're after a bolt-on power upgrade that includes everything you need then look no further than Baileys Diesel Group. Their upgraded fuel systems offer gains of 500Nm in the Stage 2 kit and they have the knowledge and experience to back up their products.

Started in a back yard shed in 1972 by Gregory Bailey, Baileys Diesel Group now has its own 1500 square metre state of the art facility, located in Wollongong, NSW. What started as a fuel injection repair business has diversified into engine diagnostics, training, fuel metering, research and development and turbocharging and performance. Baileys are also committed to offering high flow fuel system components for Denso common rail equipped vehicles including HiLux, Prado, D-MAX, Colorado, Navara and Rodeo.

Their combination of diesel injection knowledge and

turbocharging research means they can offer several kits to hugely increase the power of your common rail diesel. On a HiLux, for example, the gains are impressive with the Stage 2 kit offering 2.5 times more power and 125% more torque than the factory output.

Prices start from \$4350 for the Stage 0 kit but all parts are available separately to suit for needs and goals. The best part is, all the kits share common parts which means you can slowly up your power by building on previous stages – or go all out from the get go with the massive power increase of Stage 2. Stage 0 includes fitting an ECU-SHOP MonsterMax KD and HD clutch kit, Stage 1 adds +50% injectors, TD05 turbo, front mount intercooler and exhaust and finally Stage 2 offers bigger injectors, a larger TD06 turbo, lift pump, surge tank and EGT and boost gauges in a pillar pod.

Baileys Diesel Group offer high flow injectors built to tiny tolerances by highly trained technicians

THE ECU-SHOP MONSTERMAX ECU IS USED IN THE WORLD'S FASTEST D-MAX ABLE TO RUN AN 8.2 SEC QUARTER MILE!



TOYOTA HILUX 1KD-FTV TUNE LEVELS

LEVEL OF TUNE	WHEEL HORSEPOWER	FLYWHEEL TORQUE
Factory output	130Hp	400Nm
Stage 0	190Hp	640+Nm
Stage 1	270Hp	800+Nm
Stage 2	345Hp	900+Nm

BAILEYS DIESEL GROUP

PH: 1800 INJECTORS

W: www.baileysdiesel.com

**FREE
FILTER KIT**

Buy injectors, fitting kit and fuel lines and receive a free 2 micron filter kit – just mention the Diesel Performance Buyer's Guide in this issue of 4WD Action.

Available until 31/03/2016
unless stocks run out.

Baileys Blueprinted Injectors are built better than factory so you can rely on them in your common-rail turbo diesel, wherever you are



BAILEYS DIESEL GROUP BLUEPRINTED INJECTORS

This is the injector upgrade your common-rail diesel needs for improved running and reliability

Built to the highest standards possible, Baileys Blueprinted Injectors are specifically designed and re-engineered for Australian fuel quality and environmental conditions. Not only that, they're offered with a better than original three year warranty and they're cheaper to buy! Baileys Diesel Group have been blueprinting injectors for over 40 years and they've seen every cause of injector failure.

Baileys Diesel Group is a global company based just south of Sydney and they're trusted to work on hugely expensive machinery across multiple industries, right up to 30,000hp diesel engines! The same care, knowledge and experience is put into every set of injectors they make – so you can rest easy knowing your 4WD is in safe hands.

Baileys Blueprinted Injectors are subjected to a

step by step process that ensures they're better than the original. Step one involves stripping down the injector. At this stage, around 50% of the injector ends up in the bin – regardless of condition as all main / key components – like nozzles and spindles, are treated as 100% replacement – a great indication of the no compromise attitude to quality BDG takes.

Step two is where the parts to be re-used are reconditioned. BDG uses world leading equipment and processes to ensure these components are at least as good as a new part, but in many cases better. Like the injector body, they can measure the bore and roundness down to 0.00001mm! Again ensuring great quality.

Step three is the main build – separated into four distinct

work zones. All settings are measured down to 0.001mm, ensuring very even flow and injector performances. This process of very tight tolerance settings is called Blueprinting, and something that is unique to a Baileys Blueprinted Injector. At this stage, they also install their custom designed Cap nuts, nozzles and spindle – all designed by BDG for Australian fuels and environments.

Once the injector is re-assembled, it is tested for 30 minutes to assess its individual spray pattern and amount. The results of this test are then individually coded into the injector – Baileys then group

injectors that have the same, or similar coding. Once installed the similarly coded injectors means less work for your ECU as it regulates fuel delivery, resulting in smoother engine performance.

Though the best part about Baileys Blueprinted injectors are the price. For example injectors for Toyota's 1KD-FTV 3.0L HiLux motor retail for \$495 each. Upgraded and coded Baileys injectors retail for just \$324.50 after exchange – that's a saving of nearly \$700 per set! Baileys can pass on their savings because their Blueprinted Injectors are so popular they're selling on an industrial scale.

WHY YOU NEED IT

- Built in Australia, Baileys Blueprinted Injectors are specifically designed and re-engineered for Aussie conditions
- Unmatched three year warranty
- Price competitive – cheaper than original manufacturers

WHAT IS BLUEPRINTING?

Blueprinting means checking and adjusting the tiny mechanical tolerances that are present in engine components. In this case, the finish and hole size of the injector are checked and then adjusted to a tighter tolerance than factory. Original specification injectors at constant 70cc flow rate may vary up to 6 or 7cc while Baileys Blueprinted Injector over the same 70cc generally vary in a 1cc window. This process means Baileys can offer their unmatched three year warranty

Baileys disassemble the original injectors then hone and re-finish them before adding brand new components



Baileys code each individual injector, then group them for your vehicle - that means your ECU delivers fuel more smoothly resulting in more consistent power

WHAT ARE DLC SPINDLES?

Spindles are the internal structure of the injector and by design they work incredibly hard while delivering diesel. To ensure longevity, Baileys coat each spindle with DLC coating, or Diamond Like Carbon coating. DLC coating means spindles have significantly less friction than original, and they're tougher and therefore more resilient if poor fuel enters the system.

ENGINEERED IN AUSTRALIA

Re-assembled to higher specifications than factory, with a diamond like coating, Baileys Blueprinted Injectors are built to last. They even have a better than factory warranty of three years!

Baileys Diesel Group is based in Wollongong where they re-manufacture all Blueprinted Injectors - they are Australian engineered for Australian conditions



BAILEYS DIESEL GROUP

PH: 1800 INJECTORS

W: www.baileysdiesel.com



BERRIMA DIESEL SERVICES

With 60 years diesel engine experience, the experts at Berrima Diesel Services offer two essential products to give your modern diesel more get up and go

Since 1956 Berrima Diesel Services have been industry leaders when it comes to expertise in diesel engines. Reinhard and Andrew Leimroth are the diesel gurus behind the Berrima name and have worked on every make and model of diesel 4WD, from old 40 Series Land-

Cruisers right up to the current breed of modern common rail diesels.

Their expertise has led to the design and manufacture of two products which have become near essential mods for any modern diesel 4WD - the DPChip and PlugNGO Throttle Controller.

PLUGNGO

Reduce throttle lag with this simple plug and play solution

WHY YOU NEED THIS

- Eliminates throttle lag
- Improves driveability
- Easy plug and play installation

Introduced in 2014, the PlugNGO Throttle Controller is a simple plug and play device that alters the acceleration curve on electronic throttle controlled vehicles. It digitally alters the shape of the curve increasing throttle response and improving your overall driving experience. Anyone who's experienced the delay in take-off when driving a modern 4WD understands the benefit of that!

With three modes - Sport, Sport Plus and Eco/Off-Road - and 18 different throttle curves available, the PlugNGO is safe, easy to use and comes with a lifetime warranty.



SPECIAL OFFER!

AVAILABLE ONLY TO READERS OF THIS PERFORMANCE GUIDE, IF YOU BUY A PLUGNGO, YOU'LL RECEIVE A FREE EDS (ENGINE DATA SCAN) 4 IN 1 VEHICLE COMPUTER!

To take advantage of this offer online, purchase a PlugNGO online at www.thediesexperts.com and enter the promo code BUYERSGUIDEPLUGNGO.

Offer ends 25/02/2016.
The PlugNGO retails for \$399.

DPCHIP

Up to 35% more power and torque, and 10% better fuel economy

WHY YOU NEED THIS

- Safe and proven power and torque gains
- Better fuel economy
- Installs within minutes

Available for all EFI engines, the legendary DPChip has 15 years development and testing in Australia under its belt, and offers power and torque increases of up to 35%, as well as improved fuel economy by as much as 10%. The DPChip for common rail diesels is simply plug and play, while for older EFI engines it's an easy DIY installation. Once installed there is no further tuning required - DPChip self-tunes as you drive, based on the live conditions. With a 60 day money back guarantee, 6-year product warranty and new vehicle engine and driveline warranty, the DPChip offers the safe performance boost that your EFI diesel needs. You won't pay more than \$1500 for a model specific DPChip. For more information and pricing for your 4WD, visit www.dpchip.com.



SPECIAL OFFER!

AVAILABLE ONLY TO READERS OF THIS PERFORMANCE GUIDE, IF YOU BUY A DPCHIP, YOU'LL RECEIVE A FREE PLUGNGO THROTTLE CONTROLLER!

To take advantage of this offer online, purchase a DPChip online at www.thediesexperts.com and enter the promo code BUYERSGUIDEDPCHIP.

Offer ends 25/02/2016.

BERRIMA DIESEL SERVICES

PH: (02) 4877 102

W: www.thediesexperts.com



LEGENDEX

Looking for a massive power and torque increase without voiding your factory warranty? Look no further...

How does a 40% power increase in a single day sound? From Genie Performance Exhausts comes the Legendex PCM or Power Command Module that, when combined with a Legendex exhaust, unleashes the true power of your 4WD. Dyno reports have seen incredible rises by as much as 40% over factory specs. That's almost like gaining a whole other set of cylinders!

The Power Command Module works by assisting your diesel's ECU to regulate

the length of time it injects fuel into the cylinder, essentially giving you more bang when the piston compresses the air and fuel. The Legendex PCM increases power extremely safely – it keeps common rail pressures and engine temperatures from creeping unnecessarily high by making hundreds of complex calculations with the factory ECU – all within the factory ECU parameters – something that's critical in extending the life of your engine.

Genie are so confident that

WHY YOU NEED IT

- Up to 40% more power and torque
- Won't void your factory warranty
- Less engine stress means longer life

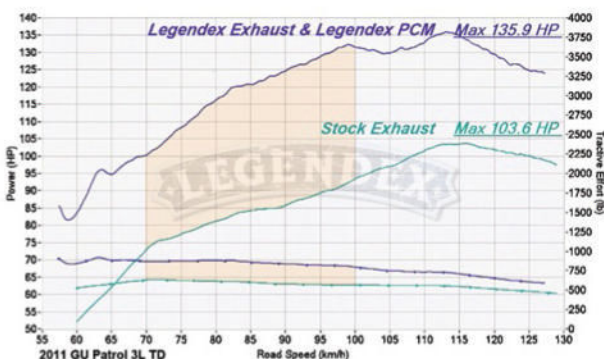
their PCM gives you safe power gains that they'll offer you a five year warranty, and guarantee that fitting the chip will not void your factory warranty. And when it comes to installation, it couldn't be easier, taking about five

minutes to plug in to your ECU and secure it within the engine bay. Best of all this whole process is completely DIY – you can even dial in the amount of power to best play with the ratio between fuel economy and power gains.

REAL DYNO RESULTS

This 3.0L Nissan Patrol saw huge gains in power and torque after fitting a PCM and Legendex exhaust combo. A massive increase of 43% horsepower at 70-100km/h

VEHICLE	HP BEFORE (70-100KM/H)	HP AFTER (70-100KM/H)	MAX % HP INCREASE
2011 Nissan Patrol 3L TD	75-92 HP	101-132HP	43% at 85km/h



GENIE PERFORMANCE EXHAUSTS

PH: (07) 3203 2333

W: www.legendex.com.au

3 MORE REASONS TO CHOOSE LEGENDEX

1 COOLER RUNNING TEMPS

With an aftermarket Legendex exhaust fitted, your engine can funnel the hot exhaust gas away faster than a stock exhaust, reducing the running temperature of your engine plus the ceramic coating effectively insulates reducing the under-bonnet temps too.

2 INCREASED FUEL ECONOMY

Thanks to the huge lower end power gains from the PCM, you can effectively lower the RPM of your engine whilst keeping the same speed. This means your fuel bill will drop as you've tuned the engine to burn the fuel in a more effective manner. How much fuel you save all comes down to how heavy your right foot is.

3 EXTENDED ENGINE LIFE

Engines that live to old age all have one thing in common – they spend a lot of time without stress. By adding power to your 4WD you can continue your normal driving habits – although this time the engine is not working as hard to maintain or gain speed.



Brunswick transform your thirsty petrol or sluggish old diesel into a modern, efficient Powerhouse

BRUNSWICK DIESELS

Transform your 4WD with a turbo diesel V8 conversion

Whatever 4WD you own, you're always going to want more power. Whether your current engine is old and tired, or you're just looking for an easy way to double or even triple your power, then Brunswick Diesels have the answer.

Brunswick Diesels is a family owned and run business that has been in operation since 1987. Since that time they've grown to a 17 person operation,

with five dedicated tradies that handle every step of the conversion in-house at their workshop. Brunswick even have a used 4WD dealership where they sell vehicles with the conversion already completed and ready to hit the tracks.

Both the 6500 Optimizer and the P400 Cobra V8 are available for both naturally aspirated and turbo intercooled conversions into many popular 4WDs

including LandCruisers 40, 60, 70, 80, 100/105 Series, Patrol GQ and GU models as well as Ford F Series and Chevy C Series. Not only will Brunswick Diesels perform an entire conversion for you, they also sell complete conversion kits for DIY 4WDers. Either way you're assured that absolutely everything is included from mounting brackets, new diff gears even a full 3in exhaust to suit your vehicle.

With a new 6.5L Garret turbo intercooled Optimizer you can expect 190kW and 750Nm of torque at the engine, while still only using as good as 12L/100Km on mixed driving. If you want to go

all out, Brunswick can also fit and tune a 6.5 Litre P400 Cobra V8 diesel for higher power – with an aftermarket turbo fitted, they've dynoed a LandCruiser running 35s and managed an unbelievable 240kW at the flywheel & 166kw at the wheels.

Not only are the big V8s powerful and efficient, parts are readily available and cost much less than you'd think – in many cases they are cheaper than locally delivered engine parts. For example new injectors are about \$105 each. Compare that to the service costs of some new engines and you've saved a bucket load.

WHY YOU NEED IT

- Huge low RPM torque, the 6.5L turbo diesel makes 400Nm at just over 1000rpm
- Complete drive-in drive-out conversions
- Reliable mechanical injection, no computer required and serviceable parts are inexpensive and available locally

As neat as a factory install, Brunswick take great care to ensure every detail is correct on every conversion



SAVE THOUSANDS ON A V8 ENGINE CONVERSION

Brunswick Diesels are offering a massive 10% off all engine conversions and engine conversion kits booked **on or before the 31/03/2016**, simply mention you saw this article in the Diesel Performance Buyer's Guide of 4WD Action.

BRUNSWICK DIESELS

PH: 08 9726 1431

W: www.brunswickdiesels.com.au



**100%
AUSSIE MADE!**

The Domin8r is fully Australian made in Ballarat, Victoria, by a company with 52 years experience. That means you get a top quality, fully Australian product for an unbeatable price!

**SAVE
OVER
\$800!**

DEAL 1

Get a Domin8r 409 Stainless Steel Exhaust* (worth \$1495) + Engine Data Scan (worth \$199) FOR ONLY \$847 + \$50 P&H*

THAT'S A TOTAL VALUE OF \$1694 AND A SAVING OF \$847 OVER 50% OFF

(*excludes Toyota 200 Series Exhausts).

DEAL 2

Buy a Domin8r Aluminised Steel Exhaust* (worth \$1295) + Engine Data Scan (worth \$199) for only \$747 + \$50 P&H*.

THAT'S A TOTAL VALUE OF \$1494 AND A SAVING OF \$747 OVER 50% OFF

(*excludes Toyota 200 Series Exhausts).

DOMIN8R EXHAUSTS

More power, better fuel economy and a cooler running engine – a Domin8r Exhaust is the essential bang-for-buck mod

Turbo diesel 4WDs are some of the most popular trucks on Aussie tracks, and a quality aftermarket exhaust system will help yours breathe easier and perform better.

4WD Supacentre offer the best value products for Aussie 4WDers, and their Domin8r Exhaust systems are no exception. Domin8r Exhausts are

purpose made for turbo diesel engines and off-road use, meaning you can rely on them when you're out in the scrub, hundreds of kays from the nearest mechanics.

Manufactured in Ballarat Victoria, the Domin8r offers Aussie made quality exhausts in both 409 stainless steel and aluminised steel, at unbeatable prices.



The Domin8r is designed to be an easy DIY fit, meaning you can save even more money by installing it at home

WHY YOU NEED IT

- Unbeatable value for money
- Helps your engine run cooler
- Improves power, torque and fuel economy

THE DOMIN8R AT A GLANCE

- Improved power, torque and fuel economy
- Available in 409 stainless steel or aluminised steel
- Large diameter 3in turbo dump pipe and mandrel bends all round for excellent gas flow
- 10mm thick 4 bolt flanges for longer gasket life
- Australian made in Ballarat
- All exhausts come with flex joints and feature reinforced hangers that connect to your factory original rubbers
- Purpose built for turbo diesels and easy to fit DIY at home

These exhausts feature 10mm, 4-bolt flanges for longer life



4WD SUPACENTRE

PH: 1800 88 39 64

W: www.4wdsupacentre.com.au

AUSSIE MADE FOR QUALITY

4WD Supacentre took a look at all of the exhausts on the market, and saw an opportunity to make big improvements. To that end, they looked to a company with a whopping 52 years of exhaust design and manufacturing experience, combined with a love of 4WDing that goes back decades.

The Domin8r was designed to bring 4WDers a purpose built exhaust that offers more power and torque, better fuel economy, long life, and a sweet sounding exhaust note. Best of all they've done this, while still maintaining 4WD Supacentre's core principle - quality products at affordable prices.

4WD Supacentre challenge you to find a better quality exhaust anywhere near this price!

CORNELL DIESEL SYSTEMS

State of the art machinery combined with 40 years experience prove why these guys are considered leaders within the diesel industry

WHY YOU NEED IT

- Up to date testing equipment and factory trained technicians
- Diagnostic experts developed through years of training and experience
- Diesel specialists who service and repair everything from injectors to large frame engine fuel systems.

Diesel injection systems are complex and not something that the average mechanic knows a whole lot about – that's why it's important to take your pride and joy to a diesel specialist. Cornell Diesel Systems have been operating in Melbourne for 40 years and have seen it all. Cornell's specialise in remanufacturing and repairing diesel pumps, injectors and turbochargers on all types of diesel vehicles from passenger 4WDs right up to massive large frame marine applications.

Cornell Diesel Systems combine their specialist knowledge of diesel fuel injection and other sub-

systems with technicians who are factory trained and utilise up to date testing equipment that covers all the major manufacturers. Their experience in the industry means they are experts at diagnosing issues and how to solve them, which saves you time and money. Not only that, Cornell Diesel Systems is a Capricorn supplier providing specialist service to the trade – as part of an alliance that includes over 13,000 members and 2,000 suppliers, Cornell Diesel Systems has a solid backing and is well recognised in the industry.



WHY CORNELLS ARE THE SPECIALISTS

- Demonstrating Cornells' specialist knowledge, they have been appointed by Denso as the first DIAG STATION outside of Japan – acknowledging their position at the top end of the diesel field
- Cornells will be based out of a new state of the art premises in March 2016 with an extensive range of modern, top quality testing equipment including the latest common rail test bench
- Cornells are committed to solving your issues with a do it once, do it right mentality – they aim to offer honest and reliable advice based on their years of valuable hands on experience

Cornell Diesel Systems are also able to offer customers performance upgrades and tuning including Steinbauer Modules, Roo Systems Remapping and performance exhausts. As such they are a one stop shop to get your diesel performing the way it should be. Cornells recommend performance upgrades particularly for customers who want to improve day to day driving as well as those who are towing or chasing better performance and more grunt for off-road

From single injectors, to massive marine diesels, Cornells do it all

WITH CONTINUED INVESTMENT IN FACILITIES, A 4WD DYNO, TRAINING AND TESTING EQUIPMENT, CORNELL DIESEL SYSTEMS PLAN TO MAINTAIN THEIR POSITION AS A LEADING DIESEL SPECIALIST IN AUSTRALIA.



DIESEL ENGINE TUNING

MECHANICAL INJECTION

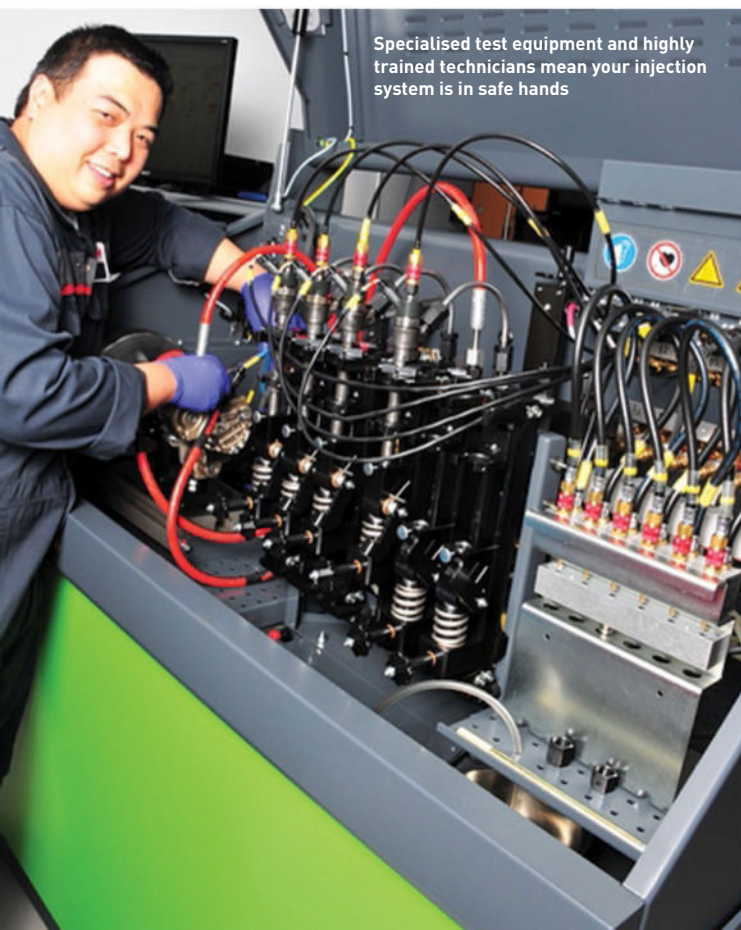
Diesel engine tuning methods have advanced a long way from the days where every 4WD was fitted with a mechanical injection system and Cornells are able to tune any diesel engine. Early mechanically injected diesel engines do need tuning to ensure the injector pump and injectors are working effectively. Cornells can bench test, re-build and even modify these units for better power or efficiency. Hard starting, blowing smoke, lack of performance, running rough, engine cut-out, knocking and overheating can all be caused by a compromised diesel fuel injection system and Cornell Diesel Systems has the knowledge, equipment and the facilities to rectify the problem.

ELECTRONIC INJECTION AND COMMON RAIL

Later diesel engines started to be fitted with electronic controls rather than mechanical, such as the Nissan ZD30 and the Toyota 1KZ-TE which eventually led to common rail diesel technology that can now be found in all manufacturers' 4WDs. Cornells are able to use the latest diagnostic scan tools to pinpoint and resolve any electrical issues in these systems, before tuning the engine even further by remapping the diesel injection parameters. Of course, Cornells can service any mechanical systems in newer engines as well.

SPECIALISED KNOWLEDGE AND EQUIPMENT

For all mechanical, electronic and common rail injection systems, special knowledge is required though it is particularly important on modern common rail engines. This is because common rail injection is incredibly complex and utilises both high pressures and high voltages to operate. Cornells even use a pressure-isolated clean room with a highly effective filtering system to ensure no foreign particles enter the common rail system and impact the tiny tolerances that are manufactured into modern diesel systems.



Specialised test equipment and highly trained technicians mean your injection system is in safe hands



Diagnostic test equipment is necessary to identify and solve issues on modern diesel injection systems. Common rail technology works at pressures up to 30,000PSI and 185 volts - it's not something you can fix in the shed



With 40 years of operation, the team at Cornell Diesel Systems have the knowledge to tune anything from old mechanical injection diesels, right up to fully electronic systems

CORNELL DIESEL SYSTEMS

PH: 03 9267 8800

W: www.cornells.com.au



DENCO

DIESEL + TURBO

**35% more power
without shortening
the life of your diesel**

WHY YOU NEED IT

- Power increase of up to 35% whilst maintaining the life of your engine
- Denco will match a turbo specifically to your engine, and it's fully repairable
- Comes complete with full front to back exhaust upgrade



After 45 years in the turbo and fuel injection repair and servicing industry, you can be sure that the staff at Denco Diesel + Turbo will have the solution for more reliable power out of your diesel. As Australia's largest stockist of the five major turbo manufacturers, you can be sure that Denco will have what you need, all under the one roof.

Most manufacturers no longer offer naturally aspirated diesels and the days of large capacity four and six cylinder diesels are disappearing – but there is still a huge following for legendary motors like the Nissan TD42 or Toyota 1HZ. Well known for their simplicity and longevity, if there is one thing they lack, it is grunt. But that doesn't need to be the case, with a Denco aftermarket turbo kit you could transform your 4WD from a slug into a much more capable vehicle both on and off-road. You'll have more power for towing the work trailer, boat or camper trailer and when you do get off the beaten track you'll have the extra punch needed to pull through sticky bogholes or get out of trouble on soft sand.

Denco Diesel + Turbo don't just offer aftermarket turbo kits, they're also injection specialists

with 45 years in the business and have factory trained technicians and modern diagnostic tools to ensure your 4WD is running at its full potential. Denco also have a 4WD dyno facility to test and tune your vehicle whether it is old or new. Not only that, Denco also offer Steinbauer Performance Enhancement modules as upgrades for late model common rail engines such as V8 Land-Cruisers or Ford Rangers that deliver up to 20% more power and come with a three year guarantee.

Fitting a Denco turbo and intercooler kit to a Toyota 1HZ shows gains from 85hp and 407Nm to a huge 121hp and 588Nm – that's more torque than a new V8 70 Series LandCruiser!

Denco are dedicated to providing solutions for your 4WD – whether it's your daily driver, work vehicle, tourer or comp truck, Denco will match a turbo system to your specific needs and increase power. Denco also note that reliability and longevity are not negatively affected by their turbo kits – they're able to balance power output with reliable low boost.



WHAT ENGINES DO THE KITS SUIT?

- Toyota: 1HZ, 2H, 3L, 5L, 5LE and B Series
- Nissan: TD27, QD32, SD22, SD33, TD42, TD42T, TD42Ti
- Mitsubishi: 4M40, 4D56
- Mazda: WL-T 2.5
- Ford: WL-T 2.5

DON'T GET STUNG BY A FAKE

Counterfeit turbochargers are becoming more and more prevalent – don't be fooled into thinking they are good value alternatives to genuine turbos. They may be advertised as 'replacement turbo for original' or 'built same as genuine'. Paul Taylor, Denco Diesel Turbocharger expert has this to say, "The problems counterfeit turbos cause include complete explosions to premature failures, and oil and gas leakage damage"

TURBOS ARE MORE ROBUST THAN YOU THINK

A turbo does not require special attention – a few periodic inspections are all that's necessary and if an engine is not performing properly it's more likely there is a separate or unrelated issue. These include incorrect fluid levels, intake or exhaust restrictions, split pressure hoses or leaking gaskets, sensor failure or worn out fuel system. Denco systems are designed and manufactured to suit Australia's harsh conditions and all turbo systems are backed by a national network of Denco Diesel and Turbo trusted distributors.

**SAVE
\$300
OFF ANY
TURBO KIT**

Use code **DIESELGUIDE** at Denco's online checkout to take \$300 off any aftermarket turbo kit.

**Offer available
until 4/3/16.**



DENCO DIESEL + TURBO

PH: 1300 305 359

W: www.dencodiesel.com.au



The Diesel Care Filter Kits come with everything you need for an easy DIY installation

SPECIAL OFFER!
SAVE \$50

Order any filter kit through Diesel Care's online store to receive \$50 off! Visit www.dieselpcare.com.au/ filtration to order now! Use coupon code 'Kit50off' to claim.

Offer ends 25/2/2016.



DIESEL CARE FILTER KITS

Protect your 4WD's engine from diesel contamination and prevent \$1000's of dollars of damage!

It's no secret that in Australia you can pick up contaminated fuel when you least expect it. This can be due to a number of reasons including poor storage of fuel. Can you imagine being halfway through tackling a remote track such as the Canning Stock Route, only to come to a dead stop because poor quality fuel has ruined your engine? Not only is it going to cost you thousands upon thousands of dollars to repair, it's going to strand you in some of the harshest terrain imaginable, in a region where

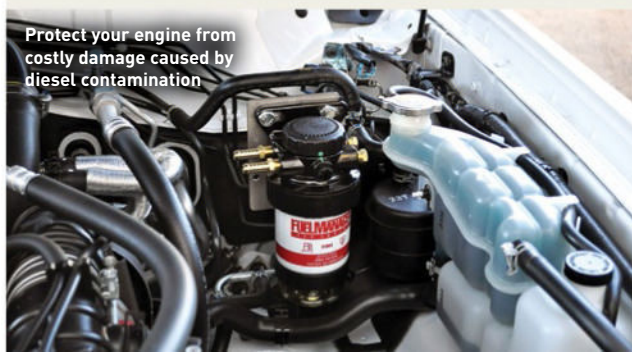
help could be days away.

Diesel Care Australia have experience in diesel engine technology extending all the way back to 1947, and have developed their Fuel Filter Kits to be a cost effective way of preventing costly and dangerous damage to your engine caused by contaminated fuel. Designed to efficiently remove particle matter and water from dirty diesel, a Diesel Care Fuel Filter Kit is the often copied, never equalled, proven way to protect your engine, and prevent costly repairs.

WHY YOU NEED IT

- Protects against bad quality fuel
- Prevent up to \$15,000 in engine damage
- Designed from almost 70 years in diesel engine experience

Protect your engine from costly damage caused by diesel contamination



WHAT'S IN THE KIT?

FUEL MANAGER FILTER

The Fuel Manager filter is one of the most trusted brands on the market. Available for light, medium and heavy duty diesel engines, Diesel Care's kits come with either 30 micron primary (pre) filter, or 2 or 5 micron secondary filters which means there's a kit to suit nearly every make and model of diesel 4WD.

AUSSIE MADE CUSTOM BRACKETS

Diesel Care Fuel Filter Kits feature a wide range of custom made high quality stainless steel mounting brackets custom made in Australia to suit a range of specific vehicles including Toyota, Nissan, Mazda and more!

ALL HOSES, FITTINGS AND CLAMPS

This is the complete kit with everything you need to install the Fuel Manager filter system

DETAILED INSTRUCTIONS

Diesel Care's step by step instructions will ensure the installation is a simple task, and can easily be accomplished as a DIY install in your home workshop.

DECADES OF EXPERIENCE WITH DIESEL ENGINES

The origins of Diesel Care can be traced all the way back to 1947. As the result of a number of mergers over the intervening decades, Diesel Care now feature a network of outlets in Dalby, Toowoomba, Goondiwindi and Tamworth.

By joining together through these mergers, Diesel Care have created greater efficiencies and now have a pooled knowledge and expertise that is almost impossible to beat. Together they have the strength, industry experience, qualified staff and state-of-the-art equipment to be at the forefront of the diesel industry in Australia.

DIESEL CARE AUSTRALIA

PH: 1800 880 150

W: www.dieselpcare.com.au

STEINBAUER POWER MODULES

Proven world-wide, this performance module will safely increase your power and torque without altering your 4WD's ECU

WHY YOU NEED IT

- Up to 20% more power and torque
- Extensively tested for Aussie conditions
- Smart and safe power gains

Most 4WDers want more power and torque from their diesel 4WDs, and there's a good reason for that - whether you're towing a camper trailer, tackling mud or soft sand, or hauling long distances in the outback, more power and torque means less stress on your engine.

The Steinbauer Performance Module is different to performance chips on offer for common-rail diesel 4WDs. While many chips simply increase fuel pressures for more performance, which in turn can cause additional stresses to your fuel system, the Steinbauer module is an intelligent, completely programmable computer module offering high end results. It does not alter your 4WD's ECU,

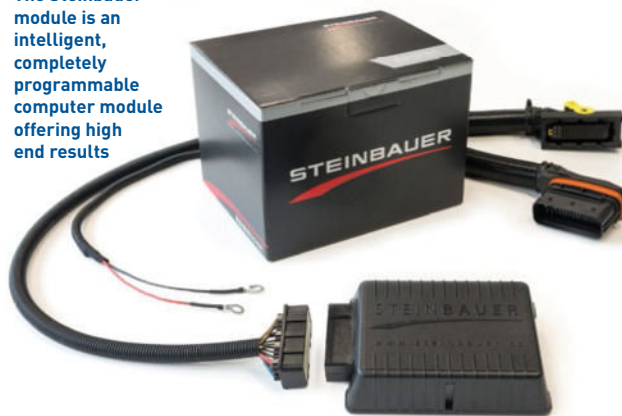
change injection timing or alter your fuel pressure.

The Steinbauer Performance Module is the original injector duration module, developed following years of research and testing and subject to rigorous quality control measures. Every single Steinbauer module is individually mapped to the vehicle - there's no 'one-size fits all' type approach which makes it completely safe.

Add to that the fact that the Steinbauer module is extensively tested for Australian conditions, features a dust, vibration and moisture resistant housing and comes with a 3-year warranty and 30-day money back guarantee, this module is well suited to Aussie diesel 4WDs.



The Steinbauer module is an intelligent, completely programmable computer module offering high end results



AT A GLANCE

- Up to 20% more power & torque
- Advanced European technology
- Rigorously field tested for Australian conditions
- Dust, vibration and moisture resistant
- No increase in common rail pressure
- Safe guard feature
- 3 Year warranty & 30 day money back guarantee
- No change in ECU programming

10% OFF!

Call 1800 733 159 to receive a crazy 10% off any Steinbauer Performance module.
Quote code '4WD100FF' to claim.

Offer ends 25/2/2016.



STEINBAUER

PH: 1800 733 159

W: www.steinbauer.com.au

THE BACKGROUND OF STEINBAUER

Manufactured in Austria with the quality and attention to detail that you would expect from European engineering, the Steinbauer module is truly world class.

Starting from humble beginnings in the mid-90s, Steinbauer began with a clear vision to improve the performance of diesel engines. Steinbauer's focus was to avoid the pitfalls of competitor products currently on the market that were focused on invasive tuning methods such as chip-tuning, flashing and pressure box technology. They went on to develop an intelligent additional electronic "Plug n Play" system. This advanced high-end module uses advanced programming based around the injection duration system and allows precise fuel control throughout the entire RPM range.

Backed by a strong, professional network of distributors and dealers, Steinbauer is currently available in over 30 countries.



DENSO

There are more 4WDs fitted with DENSO common rail systems in Australia - find out why they're so trusted

Few can argue with the benefits that common rail diesel fuel systems offer - they allow your engine to output more power and torque while improving fuel economy. At the same time they operate at very high pressures, meaning they require very precise calibration and testing to ensure reliability and effectiveness.

In 1995 DENSO launched the world's very first diesel common rail injection system for trucks. The very next year,

they began supplying the same technology to passenger vehicle manufacturers. Since then, DENSO has been actively involved in developing advanced diesel engine technologies and today their diesel fuel injectors lead the industry in fuel pressure, precision and timing.

Because of their reputation, DENSO fuel injection systems are fitted to many of today's popular vehicles; ranging from passenger and light commercial, 4WD to heavy duty trucks

WHY YOU NEED IT

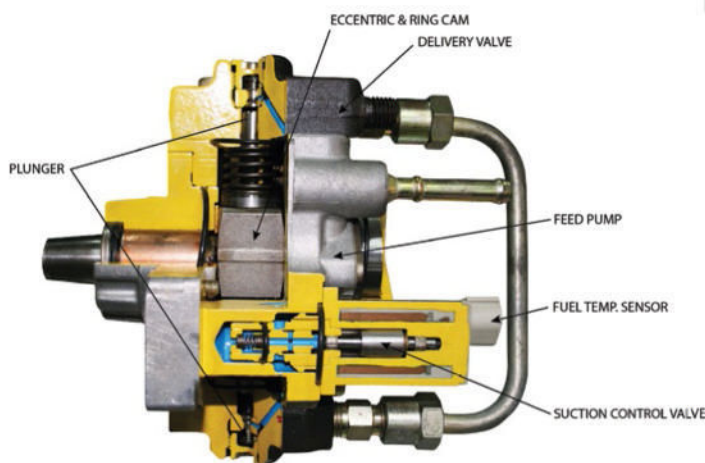
- A leader in diesel common rail systems
- Trusted by manufacturers worldwide
- Used in most 4WDs in Australia

and off-highway applications, including:

- Toyota HiLux, LandCruiser, Prado, Fortuner and RAV4
- Nissan D40 Navara and R51 Pathfinder
- Mitsubishi Triton, Pajero and Challenger
- Holden RG Colorado and Colorado 7

- Isuzu Ute D-MAX and MU-X

As a result, DENSO are one of the biggest suppliers of advanced automotive systems and components for major vehicle manufacturers around the world and unsurpassed in the development of diesel common rail technology.



DENSO REMANUFACTURED INJECTORS

At some point, due to fuel contamination or blockage, these diesel injectors will need to be replaced. This can be a very expensive exercise and can often result in the need to change the fuel pump, common rail and fuel lines. Previously all of these items had to be replaced with new components resulting in expensive repair bills. Now there is a more viable and affordable repair option and in response to the rapid growth of diesel powered vehicles in our local market, DENSO Australia offer customers remanufactured fuel injectors. These injectors are sold exclusively through their extensive dealer network.



DENSO remanufactured injectors are calibration coded to ensure optimum engine performance is achieved



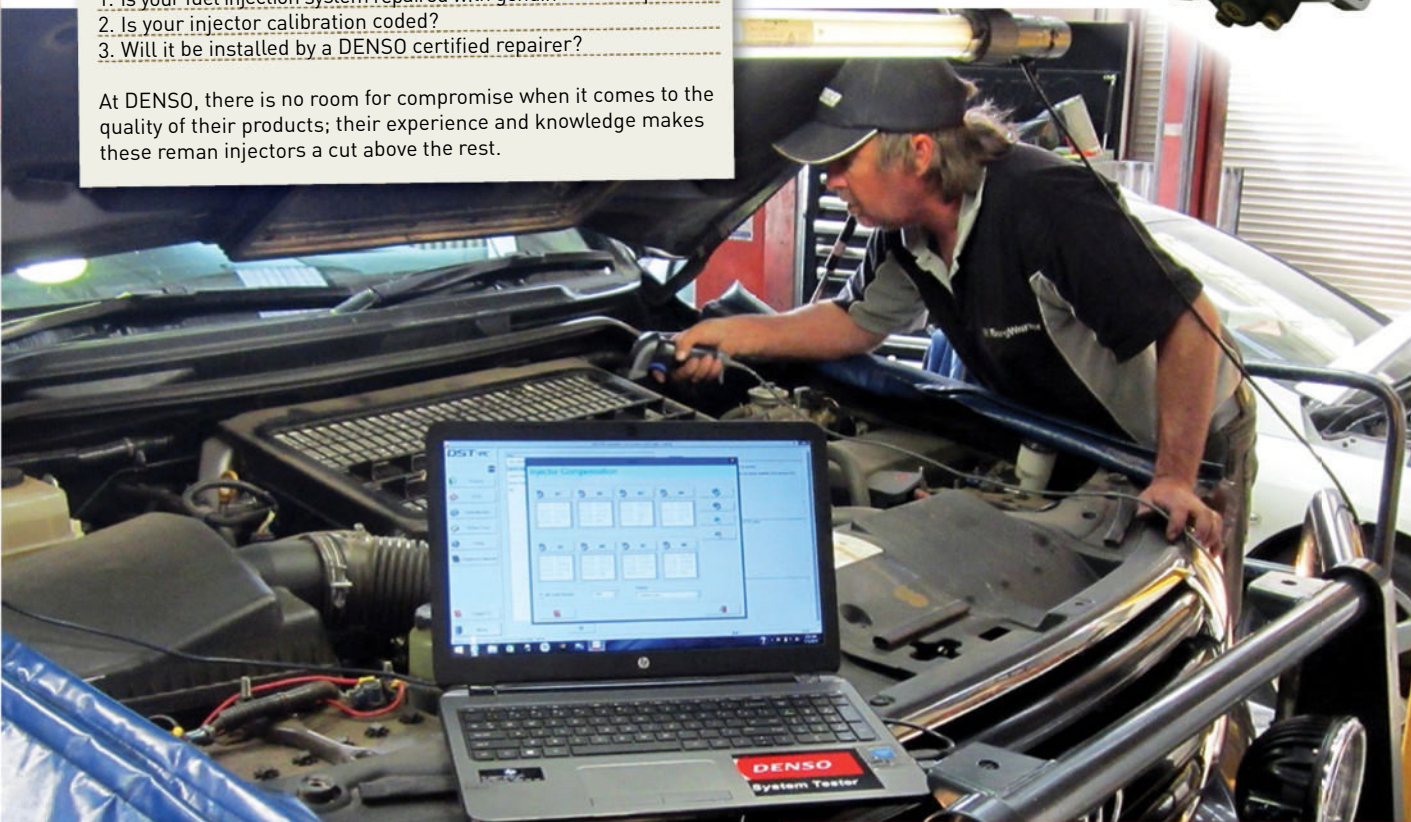
DENSO SERVICE DEALER NETWORK

These certified repairers offer the only authorised test solution. They are factory trained and fully equipped with the latest tools to diagnose and repair diesel vehicles; including the full servicing of diesel fuel pumps. As you might imagine, the repair process for these high-tech injectors has to be stringently controlled. Genuine parts are used to ensure vehicle integrity and longevity, and certified repairers must carry out and conform to stringent worldwide emission tests. Additionally, DENSO reman injectors are calibration coded to ensure optimum engine performance is achieved after the repair event.

So, before your next diesel service ask:

1. Is your fuel injection system repaired with genuine DENSO parts?
2. Is your injector calibration coded?
3. Will it be installed by a DENSO certified repairer?

At DENSO, there is no room for compromise when it comes to the quality of their products; their experience and knowledge makes these reman injectors a cut above the rest.



DENSO certified repairers are factory trained and fully equipped with the latest tools to diagnose and repair vehicles

DENSO

DENSO Diesel service dealers can be found all around the country so you'll be sure to find one near you.

For an extensive list visit www.densoautoparts.com.au



Water is the most common cause of fuel contamination and it can happen anywhere, anytime

FUEL DOCTOR

One simple step to maintain your fuel system and increase responsiveness, economy and power

Whenever you fill up your 4WD you're at risk of getting small amounts of water in your diesel – this can happen due to improperly sealed underground tanks at service stations or from water present in fuel tankers delivering the diesel. Water is the most common cause of fuel contamination and as little as 0.5% water in your fuel means you're at risk of microorganisms being present in your tank. Both water and microbes are bad news for your engine, injector pump and injectors causing premature wear and leading to expensive repairs.

Fuel Doctors are an Australian company that specialise in fuel testing, fuel tank cleaning and preventative maintenance. Their expertise in mechanical and chemical engineering lead to the development of Fuel Doctor – a

fuel treatment that completely encapsulates water in the tank and then mixes with the diesel. This allows the moisture to pass through the combustion process without coming into contact with fuel pumps, injectors or oxygen sensors. The moisture is simply evaporated in the combustion process and passes out the exhaust. Since its development and introduction in 1994, Fuel Doctors have constantly researched, real-world tested and proven their fuel treatment in a variety of industries by cleaning inaccessible fuel tanks all over Australia.

When your 4WD is running, diesel circulates from your tank to the injector pump and then any unused fuel returns to the tank – this returning fuel is warm, creating the perfect environment for diesel microorganisms to thrive and

WHY YOU NEED IT

- Removes water and microbial material from your diesel
- Avoid premature damage and costly repairs to your pump and injectors
- Improve efficiency and power
- Increases diesel lubricity, ensuring extended pump and injector life

multiply. These organisms create an acidic by-product that damages the finely machined injection system as it passes through, leading to premature wear. Not only does Fuel Doctor completely remove contaminants from the fuel system, it also breaks down the microbial material which causes the problem – no more filters blocked with slime and sludge.

Fuel Doctor can be used consistently to guard against fuel system damage, while even a one off shock treatment can rectify intermittent power issues and reduce the water and microbe level in your tank. Fuel

Doctor is measured straight into your fuel tank and uses a 1 to 4000 ratio, so it won't break the bank. Available in a handy glovebox size container for up to 11 tanks of fuel, or in bulk for longer trips, remember that preventative maintenance doesn't cost – it saves!

If you're heading to Cape York make sure you stop in to the Fuel Doctors' Far North Queensland depot. They can perform a check-up or service and you can have a chat about the real world of fuel supply, handling, storage and how to extend the operating life of your 4WD's fuel system.

WHAT ARE DIESEL MICROBES?

Commonly referred to as algae, the sludge-like build up in diesel fuel tanks is actually a fungus – this microorganism is known as *Cladosporium Resinae* and it is able to live in and use hydrocarbons, such as diesel, as a source of food.

Diesel microorganisms are bad news for your engine and your back pocket – they cause damage to the injection system and affect your economy

Fuel Doctor is simply added directly to your diesel when you fill up

**TRUSTED
IN 4WD,
MARINE, MINING
& CONSTRUCTION
INDUSTRIES
ACROSS
AUSTRALIA**

Fuel Doctors specialise in cleaning and removing contaminants from fuel tanks in all industries

SIGNS YOUR 4WD NEEDS FUEL DOCTOR

Water and microbial contamination in your diesel can cause inconsistent idle and power, poor economy and create more smoke. As the microbes spread, they will clog filters leading to rough running and hard starting. If your in-tank filter clogs completely, it will starve your engine potentially causing your 4WD to stop and not re-start till it has been cleared. You'll need to remove the tank and then clear the blockage which is a hassle anytime, and much more difficult if you're travelling remote. Fuel Doctor will clear and remove contaminants and water with nothing more than a squirt into the fuel tank.

INCREASE POWER & EFFICIENCY

Not only does Fuel Doctor keep your diesel contaminant free, it also removes the gums and varnish that attach to injectors and valve faces in the normal combustion process. Vehicles that have travelled over 100,000km are likely to suffer from build-up, due to the remnants of the occasional tank of poor quality fuel. The varnish and gums result in improper valve seating that robs compression from the cylinder – this leads to decreased combustion efficiency and increases unburnt fuel which in turn compounds the effect on valve faces and injectors. Fuel Doctor removes these deposits restoring power and economy!

INCREASED DIESEL LUBRICATION

Comprehensive independent tests carried out by BP concluded that Fuel Doctor has no detrimental effects on their fuels, while a high frequency reciprocating rig test confirmed increased diesel lubricity. That's good news for modern or older diesels, providing extra lubrication to your vital fuel and injection system.

Fuel Doctor works by encapsulating the water present in your tank, creating a micro-emulsion that allows the water to pass through the injection system without damage



FUEL DOCTORS

PH: (07) 3217 0077

W: www.fueldoctors.com

Simple to operate, the Manual Mapper uses a rotating knob to adjust fuel delivery and a switch to toggle EGR operation on or off



OZBUSH ELECTRONICS

Manually control your fuel delivery and EGR system for extra power

WHY YOU NEED IT

- Control your fuel delivery amount by +/- 15%
- Simple plug and play connection
- Increased fuel economy and power in any situation

The Manual Mapper is a new product that allows you to adjust your 4WD's fuel delivery on the go, with a simple rotary dial. Not only that, once you're off-road you can flick a switch to turn the EGR system on or off. No need for an illegal EGR block off, the Manual Mapper temporarily feeds a signal into your ECU that stops the EGR from opening. No check engine light or error codes will flash up, potentially saving your 4WD from going into limp mode. If you've unpacked the 4WD, wind the fuel back to increase your economy. On the other hand if you're towing, loaded up or simply want the extra power you can smoothly adjust the fuel delivery to match your needs.

Ozbush Electronics was founded by an ex-automotive design engineer and 4WDer who spent his whole life working on vehicle and military electronics. A huge effort was put into making sure the Manual Mapper was tough enough for Aussie conditions. Constructed of die

cast aluminium, the electronics are protected by a rugged military style resin and silicon moulding, which means the unit is IP67 rated to be waterproof and dust proof. Not only that, it was designed and tested to withstand temperatures from -25°C to 85°C. Even better, it's developed and manufactured right here in Australia.

Currently available for Mazda BT-50 2006-2011, Ford

Ranger PJ/PK and Toyota HiLux and Prado with 1KD-FTV engine, Ozbush customers report that fuel consumption is remarkably reduced. Currently the Manual Mapper is being developed for other makes and models including Holden, Isuzu, Jeep, Mitsubishi and Nissan.

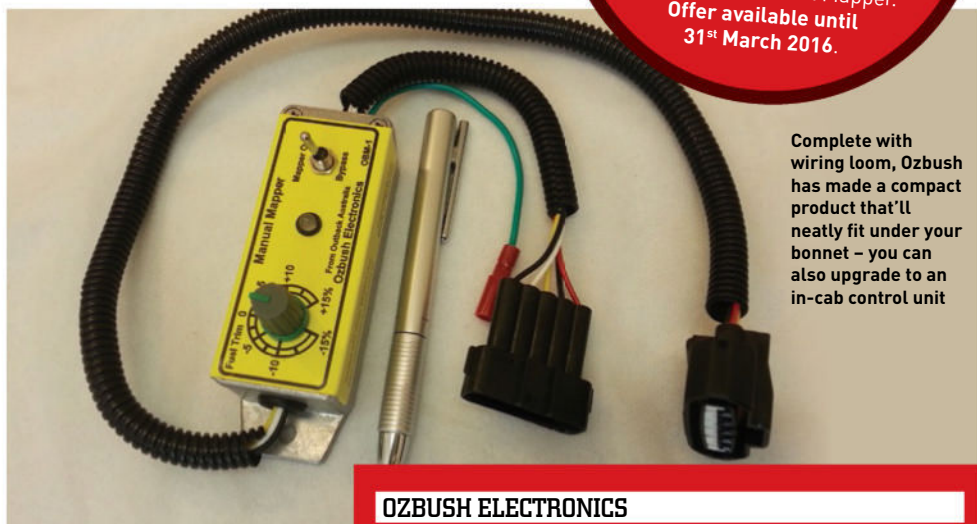
Compact (only 9cm long, 3.5cm front and 3cm high) and easy to fit and use, the Manual Mapper is available as a kit that is fitted under your bonnet, or you

can opt for the in cabin control unit for even easier on the go adjustment.

Available from just \$150, the Manual Mapper is a fantastic way to improve your power and economy at a bargain price!

**GET A
FREE
EGR HARNESS**

Any customer who mentions this buyer's guide will receive a free EGR Harness worth \$30 when they purchase a Manual Mapper. Offer available until 31st March 2016.



Complete with wiring loom, Ozbush has made a compact product that'll neatly fit under your bonnet – you can also upgrade to an in-cab control unit

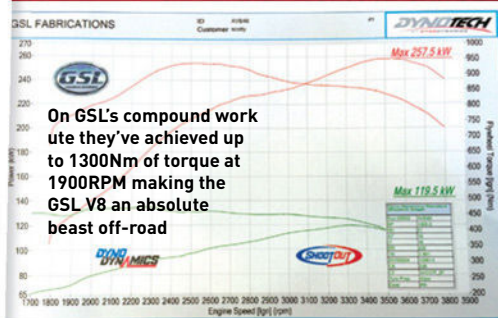
OZBUSH ELECTRONICS

PH: 0425 221 412

W: www.ozbushelectronics.com.au

**TRIPLE
YOUR
POWER**
**QUADRUPLE
YOUR
TORQUE**

Front mount inter-cooler, custom piping and intake and a big turbo – that's how GSL transform your 'Cruiser into a weapon!



HUGE POWER INCREASE

When GSL run stock LandCruisers on the dyno on average put out 105kW and 335Nm at the rear wheels.

Compare that to the 100% kit, with which GSL have put out more than 257kW and 875Nm. That's a massive 145% increase in power and over 150% in torque – that's why GSL say their kits represent the minimum expected power increase!

PREFER DIY?

If you're handy on the tools, GSL can send a kit to you. The 40% kit will take about 3-4 hours to install making it an easy way to add big power to your V8 in a single day. If you've bought a kit and need a hand installing it, call after hours or on weekends for step by step advice over the phone! The 60% and 100% kits need dyno tuning to run effectively, but if you want a mail-out kit GSL will help you out wherever you are in Australia

GSL's power upgrade kits offer comparable fuel economy to stock – by using custom tuning, GSL match boost and fuel input so that in general driving you're not chewing fuel, while still offering huge power when you need it. Perfect for daily driving, towing for work, or extra power in off-road situations.

GSL FABRICATIONS

Unleash the potential of your Toyota V8 LandCruiser – triple the power and four times the torque!

WHY YOU NEED IT

- Bolt on kits that offer a massive 40, 60 or 100% minimum power and torque increase
- Uses only the top brands and best quality parts
- In-house fabrication to ensure neat and professional install

GSL are an Australian company that are frontrunners in the big diesel power game. If you tow heavy trailers, tackle crazy tracks or just want ballistic power then GSL offer everything you need to power up your V8 'Cruiser anywhere up to 300kW and 1300Nm. GSL offer three kits and a range of options, plus with a tune specific to your vehicle you can be sure you're getting exactly what you want. All three blokes at GSL own Toyotas so there is constant real world research, development and testing on

their own vehicles and they are passionate about what they do.

The basis for all their kits is GSL's custom exhaust design – with a 5in dump pipe tapering into a full 4in exhaust, paired with a 2in crossover pipe the big Toyota V8 sounds like a monster and breathes better than ever. Along with a performance module, GSL expect you'll see a minimum 40% increase of both power and torque.

The 60% kit adds a HKS performance module and custom tune, as well as GSL's

custom designed 4in to 2.5in inlet pipe from the airbox to turbo. The large diameter pipe allows the turbo to suck in maximum air and create more power. The original injectors and turbo are used, but for the V8 to reach its potential an in-house tune is required.

The 100% kit is in a completely different league. Using the same components and tuning GSL are able to gain 150% more power and torque. The 100% kit includes all the same parts from the 40% and 60% kits but also adds upgraded injectors, a front mount intercooler

and custom piping, lift pump for more fuel delivery, an external wastegate on the crossover pipe and your choice of a turbo suited to towing and low-down torque or a compound turbo for huge overall power.

**SAVE
\$680 ON THE
40% KIT**

GSL are offering a huge 10% off their 40% power upgrade kit, for three weeks only! If you're interested in over 60% or 100% more power give the boys a call and they'll do you a special deal. To claim, mention the 4WD Action Diesel Performance Buyers Guide and buy before the 25/02/16.

GSL FABRICATIONS

PH: 0488 22 64 62

W: www.gslfabrications.com.au



MTQ ENGINE SYSTEMS

With over 40 years' experience, MTQ is Australia's largest diesel injection and aftermarket turbo specialist

4WDers get pretty attached to their choice of vehicle, so it makes sense that you'd want to trust a diesel and turbo specialist who have the experience and the reach to offer industry leading services and aftermarket modifications.

MTQ Engine Systems have over 40 years of experience specialising in turbochargers, diesel fuel injection and performance products, and have spent much of that time dedicated to 4WD diesel engines. With 11 branches and

regional distributors located Australia wide in both metro and rural areas, their network is the largest in Australia which means wherever you're located, or however far through your big lap you are, there's an MTQ Engine Systems near you.

MTQ know that performance is a large part of 4WDing in Australia, and as a result they offer two products specially designed for Aussie 4WDers - the DTS Turbo Kit and Rapid Performance Modules.

DTS TURBO KITS

Manufactured and tested for Aussie conditions, DTS Turbo Kits have been proven off-road for over 20 years

WHY YOU NEED THIS

- Up to 45% more power and torque
- Specially designed for Toyota and Nissan 4WDs
- Made from only the highest quality components

If there's one thing that all 4WDers agree on, it's that more grunt is a necessity! DTS Turbo Kits are manufactured and tested for Australian conditions. Backed by factory trained technicians and with access to the best equipment and facilities, DTS makes sure that all of their Turbo Kits use only the highest quality components to ensure you can rely on them in the toughest conditions.

Available for Toyota and Nissan 4WDs, these award-winning turbo kits are backed with national technical support, and 20 years of experience building aftermarket turbochargers for Aussie 4WDers.

For those looking at big power gains, DTS have recently developed a turbo upgrade kit for the popular TD42T Nissan Patrols. This is on top of their already extensive range of aftermarket turbo options for a wide variety of Nissan and Toyota engines.

These aftermarket turbo kits offer huge power and torque increases



PROVEN PERFORMANCE GAINS

If you remember back to the massive turbo comparo in issue 173 of 4WD Action, then you'll remember that the DTS Turbo Kit was named best in show. In this test, it was shown that adding a DTS Turbo Kit to a 1HZ engine from a Toyota LandCruiser returned a huge **39% gain** in power, and an incredible **45% gain** in torque!

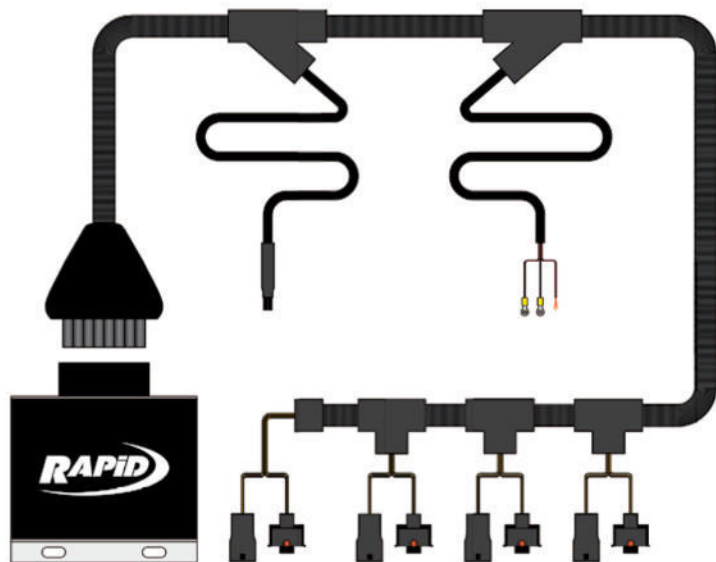


RAPID PERFORMANCE MODULES

A product of continuing research and development, these performance modules have been proven over more than 20 years of use

WHY YOU NEED THIS

- Optimise your fuel economy
- Improves driveability
- One of the toughest chips on the market



Designed using only the best quality materials and technology, Rapid Performance Modules have been in production since 1995, and are the result of continual research and development.

Offering up to 25% more power and torque, optimised fuel economy and better towing ability and driveability, Rapid are one of the toughest chips on the market.

The Rapid Module itself is placed in a metal casing exceeding most automotive standards, unlike many other brands that use a plastic casing. The electronics are then filled with resin to make it 100% sealed. Utilising OEM sealed connectors, the Rapid Module system is able to withstand anything you can throw at it.

Rapid Modules take advantage of digital technology and have the ability to be tuned to an individual user's needs unlike some modules or chips that use analogue resistors that have no further customisation after installation.

All Rapid Modules come with a 3-year unlimited kilometre warranty and have national technical support so you can buy Rapid Performance Modules with confidence and peace of mind.

SPECIAL OFFER!

GET 10% OFF A DTS TURBO KIT OR RAPID MODULE!

Mention this 4WD Action performance guide when purchasing a DTS Turbo Kit or Rapid Performance Module at any MTQ branch to receive 10% off RRP.

Offer ends 25/2/2016.



MTQ ENGINE SYSTEMS

PH: 1800 282 530

W: www.mtqes.com.au



KING BROWN EXHAUSTS

Designed right here in Australia specifically for our harsh conditions, these exhaust systems offer an incredible performance boost for your 4WD

Few would argue with the fact that Australia has some pretty unique conditions, especially when it comes to off-road touring. From the heat of the Simpson Desert, the remoteness of the Kimberley and the sub-zero temperatures of the High Country, it really is one extreme to the other.

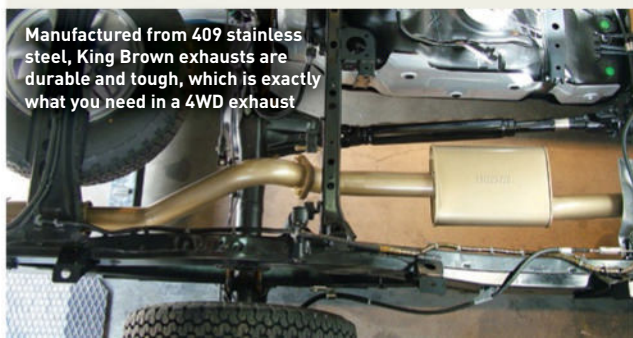
King Brown 4x4 Performance Exhausts are designed and manufactured right here in Australia by Pacemaker, leaders in performance exhausts. Pacemaker know just how unique Aussie

conditions are, and that's why they've designed their King Brown exhausts specifically to suit this country's harsh off-road lifestyle.

Offering more power and torque, improved fuel economy and a massive 5-year warranty, the King Brown 4x4 Exhaust has been manufactured using the very latest in manufacturing and bending technologies. Combine that with the use of top quality 409 stainless steel, and you've got an exhaust system that's specifically manufactured to suit Aussie 4WDs.

WHY YOU NEED THIS

- Aussie made for Aussie conditions
- Massive 5-year warranty
- Made from high quality 409 Stainless Steel



Manufactured from 409 stainless steel, King Brown exhausts are durable and tough, which is exactly what you need in a 4WD exhaust



THE BENEFITS OF FITTING A KING BROWN EXHAUST

BETTER FOR TOWING

Whether you're towing a camper trailer or a boat, we all know how much hauling a load can limit your 4WD's performance. A King Brown Exhaust will increase your pulling power when you have a trailer hitched up, whether you're hauling along a beach or along the blacktop.

MADE FROM QUALITY COMPONENTS

From the mandrel bent 409 stainless steel material, to the 10mm laser cut flanges and brackets, the King Brown Exhaust is made from only top quality components which gives them a longer life.

SAVE ON FUEL COSTS

In addition to more power and torque, a King Brown system typically improves your fuel economy by as much as 10%. That means less money spent at the fuel bowser, and more on 4WDing!



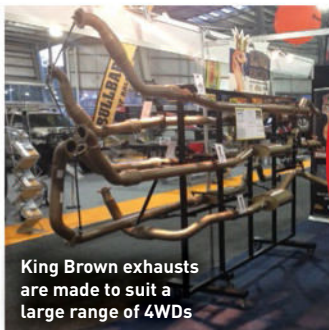
With its distinctive "King Brown" coating, this exhaust system looks, and performs to the part



WHY 409 STAINLESS STEEL?

409 Stainless Steel is the ultimate material when it comes to 4WD exhausts. Designed to stretch and flex from the normal torsion loads generated by heat stress and engine vibration, 409 Stainless Steel is specifically suited to off-road systems, which is precisely why Pacemaker chose that material for use in its King Brown 4x4 Performance Exhausts.

Additionally, King Brown exhausts are finished in a light signature coloured "King Brown" snake skin coating, which is designed to keep your exhaust system looking its best and performing at its peak for years to come.



King Brown exhausts are made to suit a large range of 4WDs

PRICES START FROM \$900

To find out how much you'll pay for a King Brown Exhaust system for your 4WD, contact Pacemaker Automotive to find your nearest stockist!

PACEMAKER AUTOMOTIVE

W: www.pacemaker.com.au



Joolca are offering all Australians free hot showers for a month!



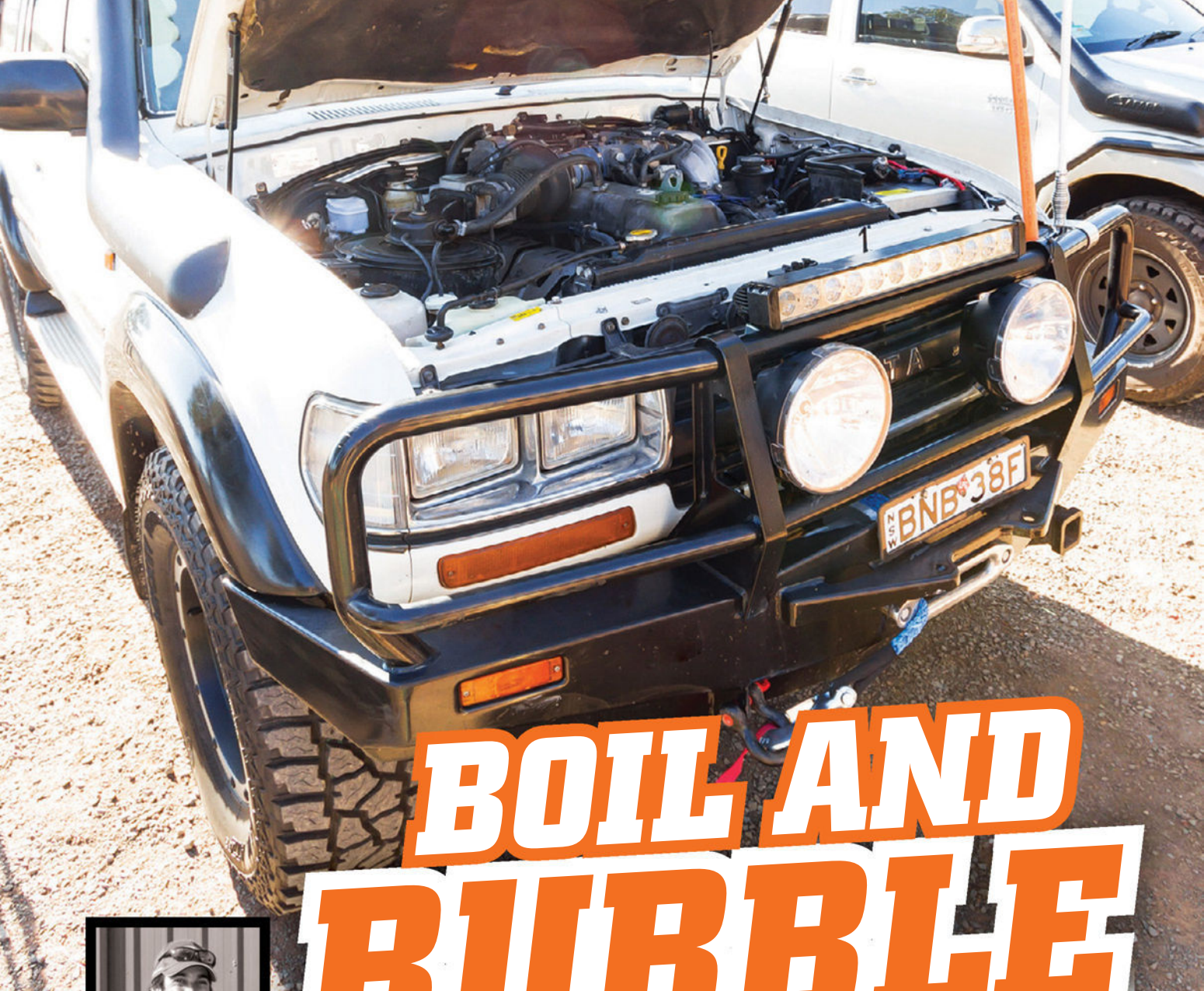
Order your HOTTAP gas water heater today, and you can enjoy free hot showers for a month. **We'll cover return shipping and provide a full refund if you're not happy with it.**

HOTTAP gives you a hot shower at the flick of a switch no matter where you are, offering a superior 6L/min water flow and heating without any inbuilt proprietary battery or pump to worry about. What's more, it's ridiculously easy to set up. **Connect water in. Connect water out. Connect gas. Done**

For a fresher take on the great outdoors, visit www.joolca.com.au/4WD or call **1300 669 500** today.

 Find us on Facebook

JCOLCA



BOIL AND BUBBLE



WORDS BY DANIEL REBER
PHOTOGRAPHY BY DAVE WOLSCHEKNO

If you've been watching the temperature gauge the entire summer, here's five things you can do to make your 4WD run cooler

It's that awful feeling; watching the water temperature needle rise while you frantically look for a place to pull over, mind racing at a million miles an hour. Have you cooked your engine? Cracked a head? Maybe it's just a faulty gauge – oh god please let it be something minor! Sound familiar? Well, we've

got bad news, it's not getting any cooler and those little issues that you didn't notice or attend to over winter are about to rise up and bite you square on the arse. That is, unless you grab your pen and paper for another five minute masterclass, as we explain five of the most common causes of overheating 4WDs. **4WD**



1

CAUSE 1: OVER- OR UNDER-FUELLING

Petrol engines run hot if they lean out; that is, if there's not enough fuel getting into the engine. Diesel engines are the exact opposite – too much fuel and they get hot. This is where air-fuel ratios come into the question, and why it's so vital – especially in a diesel – to have your vehicle maintained and correctly tuned.

Dirty fuel injectors in a diesel have a tendency to not seal properly, and can dribble excess fuel into the combustion chamber. Too much fuel means too much heat, and all of a sudden your EGTs are sky-rocketing, closely followed by your coolant temperatures. Petrol motors running lean from undersupply of fuel isn't as common an occurrence, but can stem from a blocked fuel filter, stuck injectors or a failing fuel pump. Most of the time however, the vehicle will just run poorly rather than run hot.

SOLUTION:

Cross poor tuning off your list by having a mechanic check your air-fuel ratios ideally on a dyno, then address the cause of the over- or under-fuelling.



2

CAUSE 2: FAULTY WATER PUMP

As the name suggests, a waterpump's job is to circulate the coolant throughout your engine and your cooling system. It needs to move the coolant a decent distance too – up through the engine and cylinder head's water galleries, and in some cases through external components like water-cooled turbos, carbies and LPG mixers.

Often, the problem is the water-pump's vanes (fan blades) can and do wear down over the years – rusting away due to poor servicing of the cooling system or age. It then gets to a point where the water pump vanes simply aren't big enough to move coolant through the system, so the hottest bits never circulate through the radiator to cool down. This is a tricky one because your waterpump can look and act fine from the outside, spinning without any play or resistance in the bearing. The fan hub itself too can fail – the viscous coupling will just spin freely even when the engine is hot if it's passed its used by date.

SOLUTION:

If you suspect your water pump isn't flowing enough coolant, simply replace it. They're cheap enough that if nothing else, you'll know it's good for another 100,000km. Test the fan hub by warming your 4WD up fully. Shut off the motor and once the fan has stopped spinning, give it a spin manually. It should move no more than a quarter of a turn at the absolute maximum – any more and there's a good chance it's slipping too much and needs replacing.



3

CAUSE 3: BLOCKED RADIATOR

So you've been playing in the mud again, and now your 4WD's running hot. You've given it a good wash and gotten rid of all mud you can see, and your radiator's looking clean as far as you can tell, but it's still getting hot running up the hills. What's the go? The problem here is that when you hit a mud hole, the mud punches up through the fins in your radiator, and more often than not the majority of it dries on the back (fan) side of the radiator. Unless you have a habit of driving everywhere in reverse, that's the side the air should exit, carrying away the heat from the radiator. When you give your radiator a wash-out from the front with the garden hose, you're not getting all of the mud – only the stuff at the front. Have a look at your radiator from behind – look through the fan and chances are you'll be able to quickly see just how blocked it is.

SOLUTION:

This is a simple one, but take it easy so you don't stuff anything up. Remove your fan, shroud and finally your radiator, and then with the garden tap on a medium flow, clean the radiator from both sides. Use a soft-bristled dustpan broom to help if you like, but be gently. Don't use a pressure washer as it will distort the cooling fins. If you need to, let it soak for a while. Wash every little bit of mud out of the fins until the water from the hose runs clear.



4

CAUSE 4: LOSS OF PRESSURE

Without getting way too deep into the science behind it all (mainly because we never paid attention in science class), vehicles run pressurised cooling systems to raise the coolant's boiling point. That's why if you've got an aftermarket or numerical temperature gauge, you'll sometimes see the coolant temp climb over 100°C – enough to boil unpressurised water in your kettle, but not a drama for a modern cooling system. Problem is, if the system loses pressure in any way, the engine will start to cook. It could be as simple as the spring in your radiator cap losing tension, or it could be as painful as a blown cylinder head gasket. Don't overlook other simple things like loose hose clamps and leaking hoses, too.

SOLUTION:

Any good mechanic will tell you to start with the basics first. Don't book it in for a new cylinder head without first trying a new radiator cap. Loss of pressure will also mean loss of coolant so keep an eye on your radiator and overflow levels, and if need be speak to a mechanic to get the cooling system pressure-tested to identify the problem.



5

CAUSE 5: FAN SHROUD

Here's one we've definitely been guilty of at some stage. It's late, you've just about got your 4WD back together but the fan and the shroud are being pains in the arse. Then the shroud, brittle from 20+ years in a hot engine bay, cracks in three big pieces. "Stuff it", you think, as you put it all back together without the shroud – and from there on in, the vehicle starts running just that bit hotter, especially when you're working it hard. Fan shrouds don't just protect fingers from spinning fans – they actually create a funnelling effect, forcing air through the radiator so that even without any natural airflow, the parts of the radiator that aren't directly in line with the fan will still have evenly distributed airflow.

SOLUTION:

This is an easy one. Get a hold of a fan shroud, and fit it!

NOTE:

Be careful when you are refilling your cooling system, that you don't get an air pocket in the top of the motor. The best way to guard against this is to first fill your radiator until it's full, then undo one of the hoses leading into the heater tap on your firewall and top the coolant up again. Finally, with the radiator cap off, start the engine and let it sit at a fast idle (1500rpm or so) until the thermostat opens. 'Burp' the motor by leaving the cap off and massaging each of the coolant hoses until you're sure no air bubbles are coming up out of the radiator neck. Do this any time you drain the cooling system.

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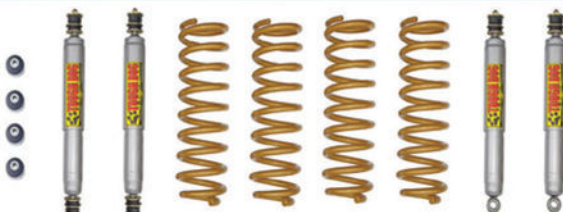
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IRONMAN BEATS ARB - 4WD Action Magazine (No. 228) featured a massive Fridge/Freezer comparison of (six) of the most popular 12V models. With 500 hours of gruelling testing, including outback torture-testing PLUS the work of a group of independent accredited engineers, the Ironman Ice Cube unit performed streaks ahead of EVERY model in the cooling capacity test, AND in the final verdict was awarded 2nd place overall.

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ROCKS, RUTS AND ROLL-OVERS




WORDS BY SHAUN WHALE, GRAHAM CAHILL AND DANIEL REBER, PHOTOGRAPHY BY WES WHITWORTH, DAVE WOLTSCHENKO AND ROBERT CAMERIERE ➔

Six make-or-break recovery tricks that every 4WDer needs to know

Like a sudden slap to the back of the head, even the most champagne day out in the bush can turn in an instant and bite you square on the rear bar. Sometimes it only takes one wrong flick of the wheel, a line one inch too far to the left or simply being distracted while duck-chugging a meat pie, cruising up your favourite beach to land you and your 4WD in a sticky (and pie-covered) mess – we're talking about getting stuck, really stuck.

Don't let a fear of getting bogged to the axles stop you

from getting out there, heck, it's just a part of owning a 4WD. But what can make or break any recovery situation is knowing how to react when things head downhill faster than Brenno on a billy cart, and take on that all too familiar, 'pear shape' (also similar to Brenno). What we're putting on paper here folks are those 'next level' recovery tricks, ones that might sound obvious but get easily forgotten in the heat of the moment and of course a few that we've learned in trial and error over a few combined lifetimes of locking hubs. 

1

STOP, BREATHE AND ASSESS THE SITUATION

- SHAUNO

"Sometimes when things go really wrong off road your first instinct can be to quickly reach for the safety gear and act as fast as possible. This might be for good reason too, you might be moments from tipping over or water is flooding into your pride and joy. Making a rush recovery decision when you're in a panic is the biggest mistake you can make off road. It's much better to analyse the situation and take the time to get your decision for best recovery practice right, than to rush it and cause more damage or injury. When I rolled the Dirty 30, we went through every recovery scenario and idea for half an hour before we did any winching. The results was one of the best roll-over recoveries a bloke could ask for that went exactly to plan, minimising any further damage."

2

SOLO SOFT SAND RECOVERIES

GRAHAM

"Sand is perhaps one of the easiest situations to get stuck in and I doubt there are many of you out there that haven't been chassis deep at some stage. The beauty of sand of course though is that it can be moved relatively easily.

A shovel and some grunt work can move any amount of sand but while that's an option, I'm a fan of leaving that as a last resort. First and foremost, let your tyres down. I don't mean knock a few PSI out I mean let those suckers down to as low as 5-10psi if need be. The difference this will make is enormous. Also, don't put your right boot through the floor and hold it there, this isn't a burn out comp! As soon as you feel wheel spin, stop and reevaluate because you are only digging yourself in deeper. Gentle back and forward motions with greatly reduced tyre pressures will get you out of just about all sand bogs; failing that, it's time to jump on the shovel and start sweating."

3

USE A PULLEY BLOCK TO STRAIGHTEN YOUR WINCH PULL

GRAHAM

"Steep country brings with it risks, not just when driving but also when the inevitable happens and you need to crank out the winch. It's vital that you recover directly up a steep slope and don't risk pulling the 4WD across the slope where it could potentially roll. Course finding suitable anchors for a straight line pull is not always possible. That's where some creative thinking and a pulley block will save the day. Running a strap out from the side of the track into the middle with a pulley block guiding the winch rope can bring the line of pull directly back into the middle of the track. It's an invaluable technique to have in your arsenal."



4

RIGHTING A ROLLED OVER 4WD

SHAUNO

"If you're unlucky enough to roll your 4WD the first thing you will want to do, after wiping the tears from your eyes, is get that vehicle back on all four wheels! Like I've mentioned previously, take the time to properly analyse the situation so you can implement the right recovery techniques. The first thing you'll want to do, which will also make you feel a lot better, is to secure the 4WD so it can't slip further down a hill or roll again. During the recovery of my roll over we had at least three winches working to make sure the recovery was as slow and controlled as possible. One of the winches was pulling me over, while another winch was letting winch rope out so when it finally did want to right back onto its wheels it didn't go over again."

WAIT!

Don't attempt to start the 4WD for some time and until checks have been carried out and the damage assessed. There could be oil filling the cylinders and inlet tract as well as potential fuel leaks.

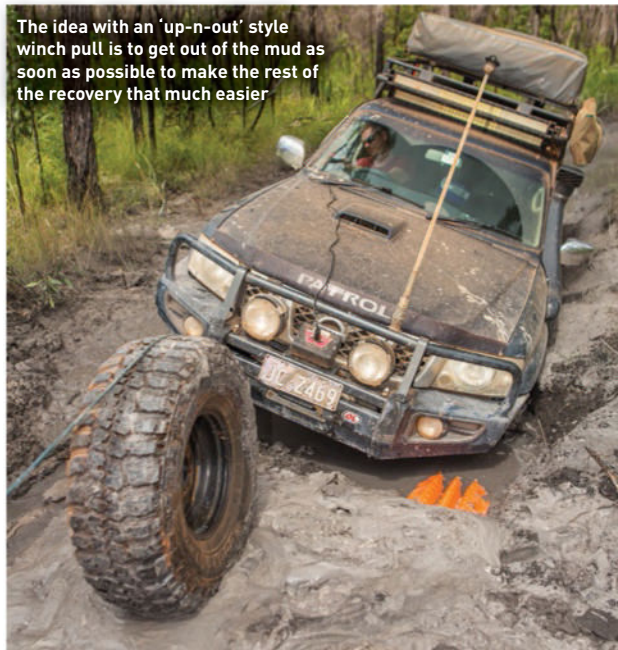
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WINCHING UP AND OUT

GRAHAM

"Often when winching the angle of the recovery is far more important than pulling power. There have been numerous times where I've found that by simply altering the angle or direction of the anchor point to change the bearing of the stuck 4WD, the recovery has been simplified greatly. One particular occurrence saw us winching out of a swampy track in the deep south of WA. Due to the restrictive nature of the track and lack of anchor options, we were stuck with a single recovery angle, which just wasn't working. The anchor point was lower than the bogged 4WD and as a result, was just pulling the vehicle down into the mud. Thinking outside the square I ran the winch rope out of the winch and up and over a spare tyre, thus essentially altering the angle of the pull to now be much higher. The result was the vehicle lifted up instead of down and was free within minutes."

The idea with an 'up-n-out' style winch pull is to get out of the mud as soon as possible to make the rest of the recovery that much easier

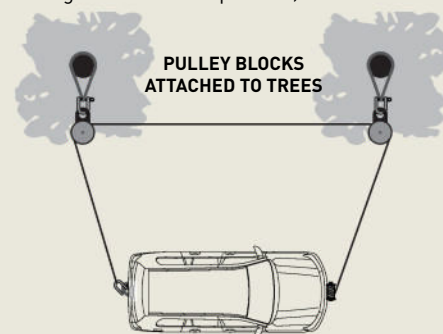


6

WINCH YOURSELF SIDWAYS

SHAUNO

"Usually recoveries are forwards or backward, but what if you can't do either without significant damage? That's where you've really got to think outside the square and look for an option sideways, which let's face it, is easier said than done. This usually happens when you've fallen out of a rut or get way too close to a tree or rock that is going to bend panels if you continue to drive. If you've got a front winch and two pulley blocks you can opt to slowly winch your own 4WD sideways. Winching your vehicle sideways will put a lot of stress on your vehicle (and winch) because you'll be dragging your vehicle as a static weight and not a rolling weight. The key is to do it little by little alternating the tow point from the front and rear of your vehicle to pull it sideways in small increments. Keep an eye on your tyre's sidewalls throughout the whole process, too."



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TWO-SEATER

STORAGE



WORDS BY BRENDAN SEYMOUR
PHOTOGRAPHY BY JESSICA SEYMOUR

If you've got a wagon or a dual-cab and you're not using the back seats, ditch em for this simple, functional storage setup!

Storage is always at a premium whenever we head bush, especially if it's on an extended trip. You've gotta look for every little bit of storage space you can, and make use of everything that's available. If you've got a four-door wagon or a dual-cab ute and you don't have tin lids (or mates who mooch rides all the time) then it's definitely worth considering ditching your second-row

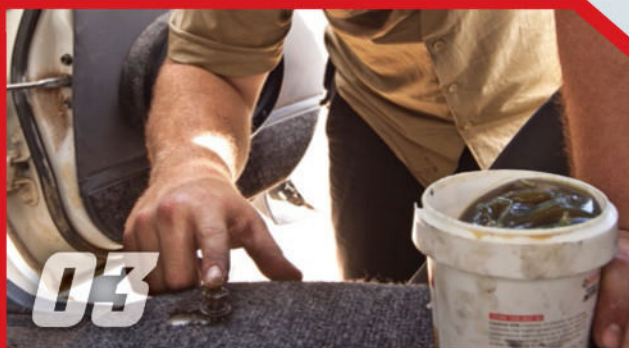
seating. Building a second-row storage system can be as basic or as complex as you like – it all comes down to what you want to carry. The 4WD Action 80 is crying out for a second fridge to run as a freezer on the big trips, and we've just had a Travel Buddy pie oven turn up that we're hanging on getting mounted. Check out this setup for an easy, functional second-row storage solution that'll change the way you head bush!



01
We're all about making things easy, and this trick will make your job a million times easier. Rather than try and measure and mark out your plywood by guesstimate, get some cardboard, tape it together and use scissors to cut it to shape around the wheel wells



02
Once it sits nicely, simply transfer it onto your plywood, mark with a permanent marker and cut your false floor with a jigsaw. We considered lifting the false floor for extra storage, but at the end of the day, the more contact the plywood has with the floorpan, the more weight it'll be able to support. A couple of lengths of 2x4 at the leading edge of the false floor sit perfectly down into the footwells, making the whole setup rock-solid and perfectly flat. Plenty of timber screws later and it's not moving a millimetre



03
All of the original seat bolts need to go back into place if the idea of a cabin full of dust doesn't appeal to use. We'll use the rear most mounting points to secure the false floor. Here's an easy trick – get your old seat bolts and wind them right down into the threads, then grab some bearing grease and put a dab on top of each of the bolt heads. Then, carefully position your false-floor down on the bolt heads, remove it and you'll have the exact locations you need to drill marked out for you. Drill them out, then a couple of longer high-tensile bolts and washers later you'll have the floor perfectly secured

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04

Jobs like these are all about how professional a finish you can get, and with a few of the right tools you can make it look like you paid the pros. Marine carpet is cheap, easy to work with and looks tops when it's done right. Start by cutting your carpet to size with a couple of inches of overlap on all sides, then cover the top of the floor in contact adhesive. Lay the carpet over the floor, and then using your staple-gun start working the carpet around the underside of the floor and stapling it into place. Pull it tight as you go, and with a few knicks with a Stanley knife on the edges, you'll be blown away by how good it will come up



06

We're going to be running a fridge as a freezer on the long trips, so to secure it properly we're running a couple of these bolts and eyelets up through the false-floor. Make sure you use big washers (mudguard washers work well) on the underside of the floor, as it spreads the load across a wider area and resists tearing out the eyelets. A couple of cam-buckle straps later, and that's our second-row storage setup complete!



LEGALITIES

A big word of warning here. We've heard third-hand stories of blokes being booked before, for removing second or even third-row seats because the vehicle no longer can carry the same amount of people it is registered to carry. If you look on your rego papers it will say 'seating capacity' – as long as you don't make any sort of permanent modification, like cutting out seatbelts or welding over mounting holes, you aren't permanently altering the seating capacity of the vehicle, which means that you're technically not breaking the law. Of course 'technically' doesn't matter one bit if you fail the attitude test and get a copper or roads inspector off-side, so if you're really concerned give a local vehicle engineer in your area a call and get his interpretation on the rules. Be warned though – registering a vehicle as a two-seater often changes it to a different (and sometimes more expensive) registration class. Of course if you're not sure, check with your local roads and traffic authority.



WHAT WE USED

2400X1200X12MM MARINE PLY: \$78

1M PLUSH MARINE CARPET: \$36

STAPLE GUN: \$12

CONTACT ADHESIVE: \$9

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05

These Travel Buddy 12v ovens are a cracking bit of gear, and the 80's going to get one as part of the second-row storage setup. Problem is, you don't want things crashing around in the back smacking into the oven, so the solution is a bit of left-over plywood and marine carpet to create a little compartment. We've ditched the included cigarette socket and we're hard-wiring the oven straight into the fuseblock off the auxiliary batteries, so it's got a permanent power supply

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- 180 litre/hr 240V pump
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NEVER LOSE ANYTHING FROM YOUR CANOPY AGAIN




WORDS BY ALLEN HODGES PHOTOGRAPHY DAVE WOLTSCHENKO →

This mod is so handy it's a necessity for any ute with wings

We have all had those days when we've been out bush for a couple of weeks and are well and truly ready to pack up and go home. The worst thing about these days is you always forget to do something, shutting the tailgate or canopy doors on your ute is one such thing.

Have you ever thought of having a buzzer to remind you

to close a door or tailgate? Well Rocket Rod from Wholesale Automatic Transmissions has fitted such a thing. Rod has come up with a canopy door buzzer that the Captain thought you lot would love to fit to your 4WD.

In this issue Rocket is going to explain how to fit a buzzer system that will save you hundreds in repairs and costs under \$50 in five easy steps. 

1

WHAT YOU NEED

You will need three momentary switches, a multicolour LED, some 4mm wire, connectors and a warning buzzer (Rod got all of his from JayCar). You will need a drill and drill bits, a screwdriver, soldering iron, some side cutters and a test light or multimeter.



2

WHERE TO PUT IT

The idea of this system is that it can be set up in an afternoon only cost you \$50. If you have three doors then all you have to do is buy three switches. The switches can be mounted up in the top corners of the doors so they are out of the way. Rocket has mounted his in the gusseting of the canopy frame, but if you don't have the gussets you will have to make brackets to mount them using some alloy angle. 25mmx25mm will be big enough to house the switches.

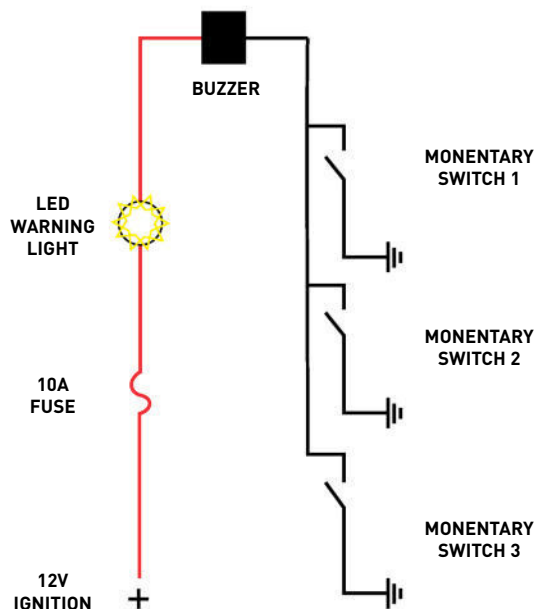


4

WIRING IT UP

Pick up 12V ignition power from the fuse box under the dash and feed it through the LED dash light then to your buzzer, securing neatly with conduit and cable ties as you go. Terminate your positive wire at the buzzer and then run the negative wire out to the momentary switches in your canopy, ensuring they are wired in parallel and individually earthed if you have more than one. Your best bet here is to find the factory wiring harness that runs out to your tray and secure your wiring neatly to that.

This idea is that when the canopy is open it will complete the circuit and turn your LED and buzzer on.



5

SET-UP AND TESTING

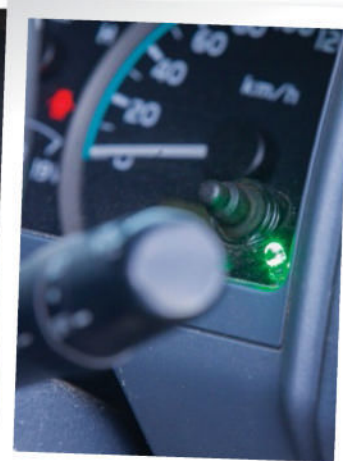
Once you have everything connected, it's time to test it. Get one of your mates to climb in the canopy with a torch and then shut the doors so they contact the momentary switches evenly, because if they are off at all you will damage the switches. With all the switches contacting, let your mate out and shut all of the doors and turn the key on. Now start opening the canopy doors one at a time to make sure the buzzer and light are working as each is opened. If it is as loud as a rock concert with the ignition on, you know it is all good and you will never forget to shut them again.



3

MOUNT IT

Drill holes in your gusset (or brackets) and slide the switches into the holes, then find a place to put the buzzer in the canopy and secure it. Rod has put his up in the front right hand corner of the canopy. Mount your LED on the dash in plain sight (Rod has put his in the bottom right hand corner of the instrument panel).



WHAT YOU NEED

WIRE: \$6.25 each for a 10M roll

TRI COLOUR LED: \$5.25

MOMENTARY SWITCHES: \$7.95 each



When combined with a remote mount UHF body, the SoundPath helps ensure your 4WD's cabin remains clutter-free

EASIER COMMUNICATION

This Aussie designed UHF mic gives you the ultimate in bush communication, right in the palm of your hand

There's no doubt about it, every 4WD needs a UHF. The thing is, there's so many devices littering our cabins these days that space can be an issue - gauges, dash-cams, reversing cameras, GPS units... the list goes on. For this very reason, a remote mount UHF can be one of the best installation decisions you make, simply because it can be mounted well out of sight, say

under your seat or inside your centre console, and completely controlled via the UHF mic.

The communications experts at GME have taken the concept of a speaker mic to a whole new level with their new SoundPath speaker mic, which is designed to give you the ultimate in UHF functionality, right in the palm of your hand.



The unique speaker in the SoundPath ensures that audio is clear and not muffled by your hand

MADE FOR 4WDERS

Having full functionality right at your fingertips is important when you're behind the wheel of a 4WD, negotiating serious off-road terrain. GME know this, and have designed the SoundPath speaker mic to feature every single function of your UHF right there in the mic.

From the crystal clear, scratch-resistant LCD screen to volume control, channel selection, scan functions, and the speaker itself, the SoundPath is a true all-in-one UHF mic.

It's also tough as nails, which is perfect for Aussie 4WDers. With improved Push To Talk performance, a scratch resistant screen and improved buttons, you can really tell that GME know just how rough us 4WDers can get with our gear.



The SoundPath has the same face-size as a standard UHF mic, but with loads more functionality

NEVER MISS A CALL AGAIN!

Arguably the most innovative part of the SoundPath speaker mic is the uniquely designed speaker, which outputs optimum sound quality. Because of the way most 4WDers hold their UHF mics, GME's challenge was to find a way to ensure the audio remained clear and isn't muffled. They've done that by utilising a convex curve-around bollard, which means that your UHF's audio is pathed outwards and away from your hand, rather than into it. It can get real noisy in the cab of a 4WD, which is why having clear audio is so important.



With every function at your fingertips, the SoundPath speaker mic offers easy bush communication

5 REASONS THE SOUNDPATH IS PERFECT FOR 4WDERS

1 SAVES IN-CAB SPACE

The SoundPath comes standard with both the TX3350 and TX3550S remote mount units, which are designed for discreet installation in almost any location within your 4WD and without the need for extension speakers.

2 PERFECT SIZE

The SoundPath has also maintained a compact design – in fact, the face of it is no bigger than a standard mic. Handy considering how many additional features it has.

3 MADE FOR AUSSIE CONDITIONS

Designed, engineered and manufactured right here in Australia, the SoundPath is a result of GME's 50 years at the forefront of Australian radio communications.

4 EASY-TO-HEAR MICROPHONE

Designed with a convex, curve-around speaker bollard, the SoundPath ensures that pathed outwards, is clear and is easily heard.

5 PACKED WITH FEATURES

SoundPath is compatible with loads of GME's convenient features such as Digital Signal Processing, Dynamic Volume Control, CTCSS, DCS and SelCall for ease of use and reliable communication.

GET YOUR HANDS ON GME'S SOUNDPATH

The SoundPath speaker mic currently comes standard with the super compact TX3350 and the fully featured TX3550S in cab units.



CONTACT

For more information on GME's SoundPath Speaker Mic visit www.GME.net.au.

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COVER YOUR BACK

This range of canopies for your ute are super tough, and will transform your touring rig

Few would argue that modern 4WD utes are one of the most versatile options when it comes to off-road touring. A canopy is one of the things that transforms a ute into a more comfortable big trip tourer that you'd be willing to take up to the Cape or across to the Kimberley. They add loads of covered and secure/lockable storage space and even a place to sleep should the weather take a turn for the worse!

The thing is, a canopy for a touring ute needs to be tough, and that's exactly what you can expect from an Engineered ABS Double Shell Canopy from Aeroklas.

These canopies feature inner and outer shells that are moulded together to bring you twice the strength and durability of a single skinned canopy and feature a higher impact resistance and the ability to reshape after an impact. Let's face it - when you're as tough on your vehicle as most 4WDers, strength and durability are hugely important features.

Available for both dual and space cab utes, the Aeroklas canopy is painted using factory quality paint giving it a perfect, glossy and flawless finish that matches your 4WD's paintjob. 4WD

CANOPIES TO SUIT MOST 4WD UTES!

Prices for Aeroklas Engineered ABS Double Shell Canopies start from \$3,436 for a dual cab and \$3,600 for a space cab. Prices vary with make and model of your 4WD and the window configuration of the canopy.



AEROKLAS CANOPIES IN A NUTSHELL

1 ULTRA TOUGH

Twice the strength of a single skin canopy and the ability to reshape following impact, all Aeroklas canopies have been water tested and drop and pendulum tested to 250kg

2 NO WEAK SPOTS

Both shells are thermoformed from a single piece of ABS with no joins

3 EASY TO USE

Single handle slam shut rear door, keyed alike to side windows

4 EASY ELECTRONICS

LED high mounted break light and LED interior light with rear door switch, connected by a simple plug and play wiring kit

5 HUGE WARRANTY

Aeroklas warranty covers three years for the inner and outer shell and twelve months for components



CONTACT

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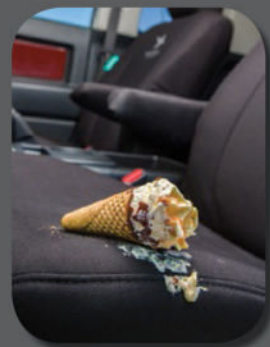
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SAY GOODBYE TO RUST

Here's how you can hit the beach in your 4WD, without worrying about corrosion!

Here we are, smack bang in the middle of summer, in the country with the best beaches in the world - makes sense you'd want to hit the sand with your 4WD!

The thing is, everyone knows how corrosive salt water and salt spray can be to an unprotected 4WD. Sure you can spend a good portion of your weekend crawling underneath your truck with a few cans of fish oil spraying every piece you can get

to, but can you really guarantee that you've protected everything?

With more than a decade of research and development under their belt, as well as thousands of test case and endorsements, Couplertec Electronic Rust Proofing systems are the proven way to help comprehensively and easily protect your 4WD from rust and corrosion. And with systems to suit your 4WD starting from just \$555, they're an affordable investment in your truck. 



This white 80 Series had Couplertec installed at 380,000km with existing rust - almost 100,000km and multiple beach trips later, the rust has not spread any further

IT'S NOT TOO LATE TO RUST PROOF!

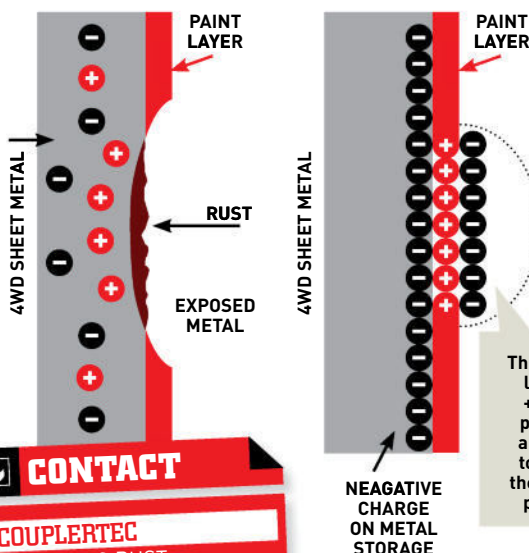
So hear you are, reading this article and thinking to yourself "well that's fine, but my GQ Patrol's already got a few rust spots - there's no helping it now!" Wrong. In fact, Couplertec have received a significant number of endorsements that confirm Couplertec's internationally patented technology can, and does stop the spread of existing rust and corrosion.

That means it's never too late to fit a Couplertec Electronic Rust Proofing system - in fact, it might be the thing that gets an extra 200,000km life from your old trusty 4WD!

HOW COUPLERTEC WORKS

Rust is actually iron oxide, which forms when oxygen combines with iron. Your 4WD's chassis and body relies on a paint layer to prevent oxygen combining with the iron in the metal. The thing is, how many 4WDs have you seen without scratches or chips on their body or chassis?

Couplertec works by adding a polarized layer of positive and negative ions, which provides a barrier that reduces the oxidization process, effectively stopping rust from forming and spreading.



CONTACT

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MAKE YOUR DAILY DRIVER FLEX BETTER

WORDS BY MICHAEL HAYES, PHOTOGRAPHY BY SUPERIOR ENGINEERING

Here is a list of suspension items that will get your daily driver flexing like a Russian gymnast

When it comes to getting the maximum amount of flex out of your 4WD, often simple upgrades to things like springs, shocks, bumpstop heights, suspension bushes or swaybar-disconnects can provide massive gains in available wheel travel.

DROP BOXES

One of the best bolt-on big lift mods for solid axles, the drop box is great in reducing the binding of rear radius arm bushes. The drop box mount lowers the rear of the arms to the same amount as the lift, essentially returning the suspension to original type geometry.

DROPPED RADIUS ARMS

When performance matters most, a pair of properly sized drop radius arms accurately correct caster and also address the pin or bush mounting geometry for maximum wheel travel and great on-road handling. As well as correcting caster, added design features such as Superior Engineering's patented SuperFlex mounting technology can also be incorporated to dramatically increase wheel travel. The ability to maintain excellent driveability is the key to success in the SuperFlex radius arm system.

HYBRID DROP BOX RADIUS ARMS

Superior Engineering has developed a combination Hybrid Long-arm Drop box style radius arms. These arms are substantially longer than the factory radius arms and the rear Pin type (axial mushroom type) mount is changed to a radial (Toyota style) rear bush. The extended arc of the longer

drop radius arm reduces binding of the bushes when articulating providing greater flex. The longer flatter arm allows the suspension to soak up the bumps, providing a softer more comfortable ride. You can also get these in the SuperFlex style arm giving amazing wheel travel while still retaining excellent on-road manners.

LONG ARMS

With the rear control arms being a key component for both smooth handling and putting power to the ground, long-arm extra-long competition style arms are available and can handle over 18in of shock travel without bind.

SWAYBAR DISCONNECTS

Sway bar disconnects allow for the quick removal of the sway bar before travelling off road by simply removing some pins. This allows you to have the benefits of additional travel and articulation in the suspension but retain the sway bar for on-road use by re-connecting.

SWAYBARS

Superior Engineering has SuperFlex Swaybar Kits (Pat. Pending) to suit GQ and GU Nissan Patrols, which are specifically designed to allow full travel and maximum articulation. Perfectly suited to those vehicles that are already enjoying the benefits of SuperFlex radius arms, without ever having to disconnect a swaybar again to go off-road! No more climbing on the ground and getting dirty or muddy after a day in the bush to reconnect the swaybar links. So without reducing comfort or articulation, fitting a swaybar can offer all round improvements in handling, tyre wear, safety and load carrying.



Front and rear swaybar set



SHOCKS

Ideally, select the most efficient (closed v travel) shock you can, that suits the vehicle. By getting the longest closed length shock that fits (minus a little bit for bump clearance), you get the most amount of possible travel for that specific vehicles geometry. In vehicles with plenty of suspension / shock room then it may be necessary to consider the open length to allow the springs to remain retained at full travel. Shocks of different brands to suit a specific lift height can have wide variations in travel and closed lengths.

SPRINGS


By fitting premium shocks that are specifically designed not only for the vehicle, but for the lift and all of the associated componentry, there is now the opportunity to fit much longer, softer and more compliant springs which are held captive between the mounts. There is no point in having shiny new long travel shocks if they sell you springs that are so stiff you can never compress them.

Generally a long soft spring with a low linear rate combined with appropriately valved shocks can provide a plush ride with smooth controlled dampening, and will allow the swaybar to handle body roll, whilst providing the maximum amount of flex.

IFS UCA's

With all the amazing shocks and suspension parts available nowadays beware fancy marketing. Claims of massive travel gains should be taken with a grain of salt unless they are combined with a heap of other parts. In many situations the factory length shock is often very close in travel to what the other components such as CVs and steering will allow before binding and damage.

When it comes to upgrading your upper control arms, the best solution is to replace the factory arm with a new 4130 chromoly upper arm. Ideally fitted with aircraft grade spherical bearings, rather than low-angle OE based ball joints is preferred. Although beware, some adjustable ball joint type arms actually have less travel than factory, are often incredibly expensive to replace and may require specific wheel offsets for tyre clearance.

As with any suspension components you may need, contact Superior Engineering for further information on the best parts for your vehicle. 


CONTACT

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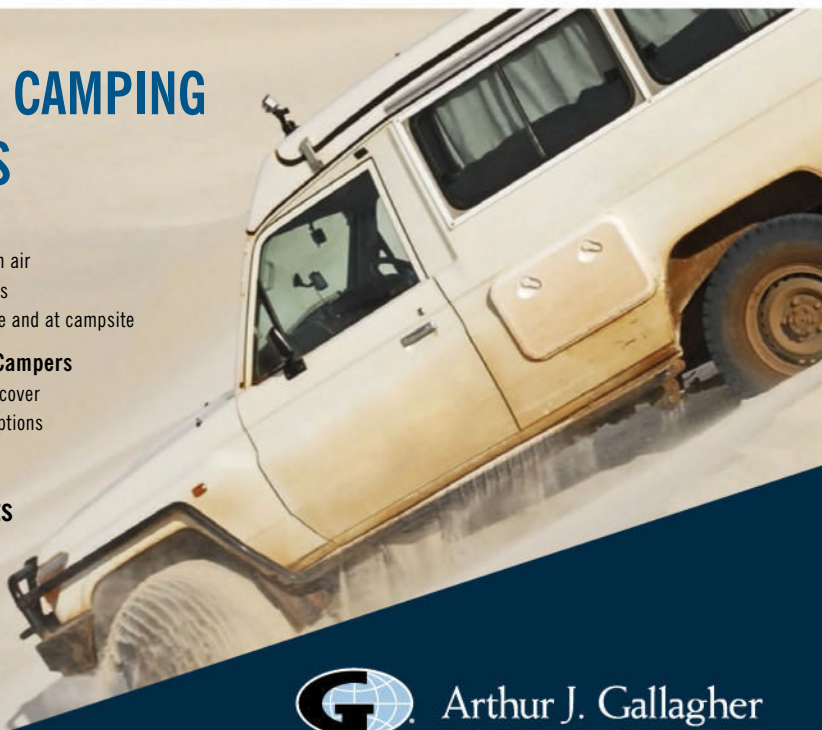
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THE

WORN SHOE FEELING

Andrew's top tips to keep your diesel running like new



WORDS BY ANDREW LEIMROTH, PHOTOGRAPHY BY MATT FEHLBERG

How many times have you thought that your rig just isn't going like it used to? Well it's amazing how many 4WDs we see in our shop that seem to have lost power over time. Once run on the dyno we see results that align with what the customer is suspecting and that there is some power loss when compared to an average of same vehicle runs. It's always a good thing to have your diesel 4WD checked for its state of tune now and then.

For older non common-rail diesels we would usually recommend they be checked and tuned every 100,000km. These simple diesels pretty much had a fuel pump and injectors and so not many things to go wrong. For common-rail diesels we actually recommend a simpler form of inspection and tune and that can be as regular as every 50,000km.

Common-rail diesels have a raft of sensors and components all working to keep the engine

running in tune. It's this complexity that we see power loss hinging from areas as simple as a dirty sensor. Sensors rarely break and usually slowly become inaccurate due to gunk build up on them with time. This is where spot cleaning of plugs and sensors can help your common-rail diesel.

Reliability is key when travelling off-road and preventative inspections and repairs are a worthwhile item to add to your vehicle's regular maintenance list. If you want to be sure your rig isn't running wearing 'worn shoes', you might want to contact your diesel expert to get it checked out and tuned if needed.

Safe Fourwheeling

Andrew Leimroth

**Berrima Diesel-
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PORTABLE POWER

\$\$\$

Portable battery systems are unquestionably the best solution for powering fridges and lights at your campsite. They allow you to upgrade your system and set up camp however you like without having to worry about the location of your vehicle.

Bainbridge Technologies has created the Baintech PowerTop, which is a brilliant option if you have solar panels because it features an unregulated DC supply connection. So, you can charge the battery when you're off fishing and have plenty of power so the beers are cold when you return to camp.

The Baintech PowerTop has a 12V 100Ah Gel Battery and charging inputs for AC, DC and solar. It also has multiple plugs including a universal USB, Engel, Baintech Lockon socket (to keep items secure over rough bush tracks) and two Ciga sockets. It's ready to power anything.



THE ULTIMATE OFF-ROAD 12V SOLUTION

\$\$\$

You never want to wake up and find your camp accessories have drained both your auxiliary battery and your starter battery. Especially, if you're outback where there's no roadside assist! So, if you're keen to get away with more power a dual battery system is a good solution.

If you want to take your 12V power systems to the next level CTEK's 100A Charging System delivers serious power for your off-road adventure. It comprises three products – the CTEK D250S Dual Smart Charger, A CTEK SmartPass Complete Management Unit, and System Monitor.

The CTEK D250S Dual is fully automatic – the five-stage charger supplies 20A to all batteries of 40-300Ah and is IP65 classified (splash and dust proof).

The 100A Charging System puts the CTEK Smart Pass and D250S Dual Smart charger together to give you power like never before. The Smartpass acts as a voltage control relay and initially passes high currents to charge your service battery quickly. When the voltage in your service battery equals your starter battery (less than 20A), charging switches automatically back to the CTEK D250S Dual.

On top of this, the 100A Charging System gives you critical information about the health of your batteries with the inclusion of a CTEK System Monitor. This monitor can calculate your amp hour draw and voltage, the state of charge, the power you have remaining, and it will even tell you how much power you are using.

CONTACT

To learn more about the 100A Charging System look at our educational video at www.baintech.com.com/chargingsystem

Bainbridge Technologies shows us the best ways to upgrade your 12V system without breaking the bank

If you are building your truck to be the ultimate track-taming vehicle or just want to go away off-grid for a few days, getting your 12V power system in order will help you enjoy the

good times on the road.

At Bainbridge Technologies, we see hundreds of world-class products, and I've sat down with our expert team to come up with the best 12V upgrades on any budget.

Michael Tyrrell

12V PANELS

\$\$\$

You can buy Ciga and merit sockets individually, but for a convenient solution look for a tough, quality power panel with a range of different socket options to suit your needs.

For instance, Bainbridge Technologies produce the Universal Power Panel. This panel allows you to plug in multiple devices, like your fridge, lights or iPhone, through different sockets. You can choose a socket combination to suit your needs, such as a panel that includes Ciga, Engel, and USB sockets.

DIY installation of these panels is a breeze – the panel is pre-wired – so you simply mount the Universal Power Panel on the dash or install it in the rear of your 4WD.

A good panel will also come with a built-in volt meter to give you the statistics you need to know.



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Kirk Barker devotes his days to bringing us a huge range of track proven products from 4WD1 Pty Ltd. He is a life-long 4WD enthusiast, and a former committee member for the 4WD Council.

Find out exactly what the experts think of when tackling the dark art of big suspension lifts

WORDS BY KIRK BARKER, PHOTOGRAPHY BY MATT FEHLBERG

Customers often ask something like, "I've got a [- insert your vehicle here -] with a 3in lift kit, so I'm chasing shocks that extend out 3 inches more than original, but compress down to the same amount as the factory shocks..."

I can see the logic here, but there are a number of things to consider. Firstly, let's assume that the vehicle with a 3in suspension lift will benefit from 3in longer shocks. (More about this in a minute). You can't have a shock that is 3 inches greater in the extended length compared to original, yet

compresses down to the same body length as the original unit. This is because the shock body (which is your compressed length) must be greater in order to allow for the increased extended length (rod length).

Perhaps your 4WD does need 3in longer shocks. However, this is rarely the case. Even with a 3in lift suspension kit fitted, the amount of extra movement between the shock mounts may be minimal. This is because of the way the axle and wheel is positioned relative to the mounting and angle of the shocks. It may be that the vehicle's sway-bars are holding the travel of the suspension back. It could be that (in the case heavy-duty springs) the extra spring rate creates less flexibility, negating the benefit of fitting a longer shock.

If we go ahead and fit the 3in longer shock, in the case of a

coil-spring vehicle, the coils may not remain captive on extended travel (the coil falls out). On compression travel (because the shock body is longer) you might destroy the shocks as the suspension pushes down past what the body length specification will allow. If the longer shocks do allow for more suspension travel than original, your brake lines may be too short (stretch and tear). You might put extra load or tension on your sway-bar. In some cases, driveline damage can occur.

On most popular Australian-sold vehicles with a suspension lift of up to 50mm, the shock length supplied (in almost any brand in the marketplace) is around the same as the original unit. This is because in most cases there is sufficient travel in the shock's stroke to allow for this type of lift. I'm not saying you could not get extra travel by

fitting a slightly longer shock, but the modifications and checklist involved are usually more than what the average family-orientated 4WD owner wants to take on.

To maximise your suspension travel with longer shocks, you need to find a safe way to stress test the suspension without shock absorbers fitted and then note the open and closed measurements between the shock mounts. You need to make sure that any modification you make to a vehicle's suspension will not affect the safe and reliable operation of the vehicle. Remember that whenever you make a modification to alleviate a certain issue, it often creates another problem you need to deal with.



CONTACT

For all the tips and gear you need contact:

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PH: 1300 004 931

W: www.4wd1.com



\$145 saves \$8000 diesel rebuild!

Most Japanese diesels gunk up well before they wear out. Just look how filthy the oil can get. As soon as it stains your fingers, it has no ability to keep the engine clean. This happens because the oil gets completely saturated with soot, leaving the oil with no ability to keep the critical piston ring area clean.

When this happens, you'd think it was worn out, and that's when people waste \$8000 or more rebuilding their diesel. Little did they know that for \$145 they could have restored it to proper operating condition.

"CEM identified this problem in the mid-1980's and 26 years ago we

developed the solution. We now save more engines from the scrap heap than anyone else in Australia" says Brid Walker, founder of CEM.

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If your wiring goes, it'll mean damaged accessories or worse



Planning ahead means you're prepared for any other accessories you'll want to add later

PLANNING YOUR BUILD



Save a bunch of time and money by speaking to a dedicated 4WD auto electrician before your next 12V modification. Their real-world 4WD experience is what your average sparky or mechanic will never learn

NEW COLUMN

WORDS BY TONY BUCKLEY PHOTOGRAPHY BY ROBERT CAMERIERE

If you're about to start building your 12V setup, or you're already deep into it, the best advice I can give you is to plan ahead and consult a 4WD auto electrician. Over the next three issues we're going show you why it's essential you chat to a 4WD sparky compared to your average auto electrician.

Dedicated 4WD auto electricians know more about 12V systems, and how they affect 4WDers in the real world, than

any text book or website will ever be able to teach someone. We know how to future-proof any setup to save you a heap of time and money down the track.

No matter how big or small your 12V question is, if you want the no-bull answer and how it affects 4WDers, we've got it. Drop in or give us a call to discuss your build. After all, advice is free, but mistakes are costly.

Tony Buckley
Adventure Auto Electric

WHAT A 4WD AUTO ELECTRICIAN CAN TEACH YOU

The most common issue we see with 12V wiring – whether it's on an old GQ or brand new 200 Series – is a serious lack of planning, and it's often not even the 4WDer's fault! The number of times we've seen sparkies, who don't know what 4WDers really need, simply tap into any random power wire under the bonnet to wire up an LED lightbar is shocking. A rushed job will cost you more to fix later (when you want to add a couple of camp lights to that circuit but the wiring is a complete mess, for example), and it's actually putting your 4WD and its passengers in serious danger.

Have you ever seen a family pile out of their 4WD because insufficient wiring to a 12V fridge caught fire the moment its compressor had to run longer than normal to counter Cape York heat? We have, and it was done by their family mechanic of 15 years who had changed plenty of oil filters in his time, but never had to run power to the rear of a 4WD.

Situated in south-east Queensland, we have people from all over Australia stop in for us to have a look at their 4WDs and camper trailers, especially for a pre-trip vehicle inspection on their way north to Fraser or the Cape. We reckon we've stopped thousands of steaks from turning just by the number of fridges with inadequate wiring we've caught in our time.

THREE STEPS TO PLAN YOUR 12V

1. Make a list of every accessory you want to add to your 4WD, even if some of these are years off. Then group them into areas – bullbar, under bonnet, roof and rear or canopy power.
2. Chat to a 4WD auto sparky to help make it happen. We'll design a system so that when the time comes for new accessories you can easily plug in to your existing platform. Don't waste your weekends or your cash on a messy job that'll make things more complicated and costly with every new mod. Chat to us at the same time to get a package deal on accessories too, that'll save you even more!
3. Now you can fit accessories without needing to trace a mess of wires by simply plugging into your new fuse blocks, 12V outlets or plugs. That'll save on install costs now and into the future! Plus, because it's set out properly your 12V mods are easy to replace or upgrade down the line.

FRIENDLY ADVICE

Tony and Mark are passionate 4WDers, camping fanatics and expert electricians. They've built a reputation for offering the friendliest service in the business – give them a call on (07) 3285 4534 and get honest, friendly advice for anything 12V. No question is too small or too silly!

CONTACT

ADVENTURE AUTO ELECTRICS

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PH: (07) 3285 4534

W: www.adventureautoelectrics.com.au


Because they're 4WDers, Tony and Mark know your 4WD in and out. They'll repair, replace or fit new accessories quicker than regular sparkies who usually work on bubble cars, saving you hundreds in labour costs!

4WDers demand so much more from their 12V systems than non-4WD mechanics realise. Ask yourself, does your local sparky know the best ways to run external wires, rooftop power or exposed canopy wiring? We do!

THE NEW WAY TO BUY 4WD ACCESSORIES

This new column from 4WD Supacentre exposes the industry practices that keep 4WD & camping accessories artificially high. It's not going to win any friends in the industry, but it might just save you a bucketload!

4WD Supacentre was founded in 2013. In just a few years it has taken the aftermarket 4WD accessory and camping gear market by storm, operating solely on the basis of providing the best value for money products on the market.

In fact, 4WD Supacentre's vision has been so well received by the public that it is now the country's leading supplier for many popular products including 12V fridges and air compressors, rear drawer systems, awnings, swags, roof top tents, and many more. 

WHY LOWER PRICE DOESN'T MEAN LOWER QUALITY

4WD Supacentre's business model is very simple. It relies on a chain of only three people, therefore minimising middlemen, delivering a quality product to your door for much less cost than major competitors.

4WD Supacentre operates with two fewer middlemen in the process compared to many traditional retailers, and delivers you a more affordable product by operating on a much smaller profit margin per product compared to competitors. By buying in bulk and cutting out the middlemen's commission, 4WD Supacentre can supply you with a similar quality (often identical and sometimes superior) product for a fraction of the cost that others can. Here's how:



"WE ARE MAKING 4WDING MORE AFFORDABLE"

HOW DO YOU KNOW 4WD SUPACENTRE'S PRODUCTS ARE GOOD QUALITY?

4WD Supacentre prides itself on manufacturing high quality 4WD and camping accessories, and with over 220,000 customers in its first two years, the 4WDers of Australia are voting with their wallets.

But just how good are 4WD Supacentre's products?

We could go into detail about the extensive R&D that goes into every 4WD Supacentre product. They're tested over 200 days a year, in Australia's most extreme environments, while filming 4WD Action DVDs. But we won't.

We could expose which major Australian 4WD accessory companies have their products made in the exact same factories as 4WD Supacentre products, and charge you twice as much. But we won't name names.

Instead, let's take a look at an independent 12V air compressor comparison conducted by Unsealed 4x4, that featured 19 of the most popular 4WD compressors for sale in Australia.

FIND OUT MORE

Head over to www.4wdsupacentre.com.au to learn more about how the 4WD industry has changed forever, and why companies like 4WD Supacentre are now able to offer you better value for money than ever before. You'll see some crazy deals there that you wouldn't have believed were possible – until now.

WIN \$500

If you own a Thumper air compressor, we want to hear from you. Simply head to www.4wdsupacentre.com, and tell us how your Thumper stacks up against your mates' 12V compressors by filling out the form in the "Contact us" tab.

The best answer will be published on the website and also win a \$500 voucher to spend online at 4WD Supacentre.

**FIVE MINUTES
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PRICE WATCH 12V compressors compared

WHAT SHOULD YOU REALLY PAY?



PRODUCT SPOTLIGHT

THUMPER MKII 12V AIR COMPRESSOR

The Thumper MKII came 4th in this independent test, beating 15 **more expensive** air compressors with some selling more than three times the price of the Thumper!

However, the Thumper MKII also retails for just \$99. 4WD Supacentre's promise to 4WDers is that it will **never** be beaten on value for money (quality products at a fair price).

ASK YOURSELVES THESE QUESTIONS...

- 1 How can manufacturers of the 18 other compressors call the Thumper MKII cheap or lesser quality, when based on performance alone, it placed 4th, beating 15 others (some of those selling for as much as \$373)?
- 2 With sustained sales of 1,500 Thumper MKII compressors every month, can thousands of Aussie 4WDers really be wrong?
- 3 Where are the 18 other compressors manufactured? Can any claim to be made in Australia?
- 4 That being the case, why are so many of these compressors a much higher price, for a product that has been independently proven to not perform as well as the \$99 Thumper MKII?
- 5 Do you believe in getting fantastic value for money as much as 4WD Supacentre believes in delivering it? If so, it should be your first stop the next time you're looking to buy 4WD and camping accessories.

4WD SUPACENTRE'S SUMMARY OF UNSEALED 4X4'S COMPRESSOR COMPARO

Published in November 2015

PRODUCT	PRICE	TEMP	SPEED IN MINUTES					Total for 5 tyres
			TYRE #1	TYRE #2	TYRE #3	TYRE #4	TYRE #5	
ARB Twin	\$870	108.9C	1.25	1.3	1.35	1.39	1.3	7.39
Mean Mother adventure II	\$299	108.1C	1.51	1.57	2.02	2.04	2.11	10.05
Ridge Ryder Ultimate	\$299	109C	1.47	1.58	2.05	2.17	2.22	10.29
Thumper MKII	NOW \$99	114C	1.57	2.02	2.08	2.27	2.34	11.08
Dr Air Pro Flow 150	\$299	115C	2.07	2.1	2.15	2.21	2.27	11.20
Repco single cylinder	\$319	103C	2.03	2.08	2.19	2.25	2.27	11.22
Ironman Flowmax Pro	\$242	109.8	2.08	2.19	2.25	2.36	2.37	12.05
AC pro(Pirahna offroad)	\$255	87.2C	2.01	2.23	2.29	2.32	2.4	12.05
ARB High Output	\$373	139.4C	2.25	2.34	2.35	2.41	2.45	13.00
Bushranger black max	\$250	71.6C	2.31	2.34	2.39	2.51	2.55	13.3
Mean Mother Maxi	\$249	126.3	2.25	2.32	2.38	3.00	3.10	13.45
Bushranger Max air III	\$350	63.7C	2.41	2.45	2.47	2.5	2.59	14.02
KCI compressor mate 150L	\$209	106.3C	2.38	2.49	3.01	3.04	3.20	14.52
Dr AIR Pro flow 75	\$185	130.4C	2.48	2.5	3.02	3.04	3.22	15.06
Ironman Flowmax	\$169	92.3C	2.54	3.01	3.06	3.18	3.53	16.12
TJM Portable	\$198	102C	3.15	3.17	3.20	3.25	3.30	16.47
Opposite lock	\$199	117.1C	3.21	3.28	3.29	3.37	3.50	17.45
KCI Compressor 90L	\$160	121.6C	3.58	4.09	4.30	4.34	4.48	21.59
Bushranger RV air	\$120	61.7C	4.14	4.17	4.35	4.5	4.56	22.52

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UNSUNG MOD HEROES

WORDS BY GRAHAM CAHILL, PHOTOGRAPHY BY DAVE WOLTSCHENKO →

It's the unseen mods that go unnoticed that make a truck what it is

I've been flapping my gums a fair bit lately about 4WD modifications – what you've got, what you haven't, what you need and what you don't. I'm going to go down this route just one more time but with a bit of a twist – I'd like to give a shout out to the unsung heroes, those mods that never get a mention, the boring, unseen and unloved.

See what got me to thinking this way was a morning spent giving my GU a service ready for an upcoming four day weekend down south. I started by giving the underbody a pressure clean to remove three months of built up grime then did the old back slither underneath to give everything a visual. While down under I made sure, as I always do, to check my recent chassis bracing along the rear for any sign of stress. There was nothing as I'd expected but it did get me to thinking.

Strengthening the rear chassis on the GU was perhaps the single most important modification I've done to the rig. Had it not been done, the old bus would literally snap in half! It was a big mod as well – the entire rear canopy had to be removed, plates made, expertly welded and my credit card nearly caught fire as a result. Afterwards, the rig looks exactly the same, drives exactly the same – in fact there really is nothing to show – other than peace of mind.

It's the kind of modification that doesn't make the headlines.

A good mate of mine just did a massive upgrade to the braking system on his four tonne touring 79. This was a lengthy process, costly and complex. The end result was an improvement but again, for the money and effort it was a mod that will go unnoticed for the most part.

How about my laminated front diff on the GU? Yep, not a cheap

exercise, can't notice anything different on or off-road, doesn't look particularly interesting, doesn't have a fancy switch to turn it on or off – It just sits there and does its job.


Or the water level monitor on the water tank? Struth, just typing that nearly caused me to doze off. Yep, knowing just how much water you have left in your on-board tank is so bloody useful – the gadget that does it though is about as exciting as bat droppings.

Here's the king of dull though, a rear airline connector. Yep. Oh don't get me wrong, being able to connect an air hose either under the bonnet OR at the rear of your truck is downright genius, the effort of doing so Vs the thrill of the reward... yeah, not so much. A true unsung hero (just like its mate the rear reversing light).

Funny thing is – it's often these hidden heroes that can make or break a build. Take my strength-

ened chassis for instance – that is literally keeping me on the road, without it I may as well start again. It is utterly vital and I'd recommend anyone with a GU coil cab to get it done yesterday – do not wait another minute.

Likewise the army of lesser mods that just exist quietly in the background combine to really make a build shine. They are often the stitching that holds a rig together and helps it do exactly what its owner intended.

I think we should raise our glasses to the mods no one likes to brag about around the campfire. "Hey Mick, that 6 inch lift is sick but you've gotta check out my water tank monitor mate..." , said nobody ever. I for one am a big fan of the little guys – they often cost a bomb, never get more than a passing mention yet without them the show just couldn't go on. Here's to the welds and widgets that keep us on the tracks! 



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from Australian 4WD Action magazine on testing 31 air compressors.

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THE GRUBS DESTROYING OUR LIFESTYLE



WORDS BY SHAUN WHALE, PHOTOGRAPHY BY ROB CAMERIERE →

It seems as if a minority of Australians have a total lack of respect for the Aussie bush

I think you can tell a heck of a lot about a person's character by the way they handle themselves in the bush. A person who shows no respect for the Australian bush and a complete disregard for the environment is nothing short of an oxygen thiefing grub in my opinion. It may sound a little harsh to some, but it's about time we all as 4WDers draw a line in the sand and stop tolerating behaviour that is going to threaten our lifestyle and restrict our access to places we love to visit.

I spent the majority of last year in the bush and was privileged enough to be able to travel across the country from west to east and north to south. One of the things that I am seeing more and more and is completely disgusting myself and many other 4WDers is the amount of (second hand) toilet

paper strung across popular campsites and tracks. I think there is a whole generation who don't know how to crap in the bush or worse still, don't give a toss.

It's happening everywhere around Australia and you can bet your last dollar more campsites, especially free ones, will be shut because of these grubs. For those people who think I'm overreacting, they might want to think about what losing free campsites really means. It's not a question of money as most free and bush campsites are absolutely stunning and let you get away from the tourists and I like many people would rather pay for this kind of isolation and privacy.

Just the other week I was driving around Sandy Cape on the west coast of Tassie, one of the most pristine wildernesses in the country and as sure as the

sun sets in the west, what do I find? Some grub couldn't even be bothered to leave the track to do his business and I had to literally drive around their mess! People who think this kind of behaviour is acceptable need to give up 4WDing because we certainly don't want them in our off-road community.

I want to give benefit of the doubt to people who genuinely don't know the correct practice to do a number two in the bush. It really is quite simple, dig a hole at least 200mm, do your business and cover that hole up with dirt so animals don't dig it up and your paper blows around the place. It's better still to burn your paper in the hole you've created, but I don't want to give this advice as too many knuckle-draggers will start bushfires.

Respect the Aussie bush so it remains accessible and open for

everyone for years to come. It's not hard to take responsibility and clean up after ourselves. Oh, and don't be afraid of pulling your mates into line if they start acting like grubs. We all have to do our bit.

Cheers

Shaun

HAVE YOUR SAY

What do you reckon, have I over-reacted or are you as sick of this as I am? Shoot me an email and let me know editorial@4wdaction.com.au

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WORDS AND PHOTOGRAPHY BY DICK EUSSEN

TROPIC DANGERS

Do you know what dangers await you in the Top End in the Wet?



The tropical seas can be deadly to the unwary and to those who ignore its dangers. While sharks and crocodiles are foremost on the minds of visitors, an almost invisible menace lurks in tropic seas between October to May. It is the world's most deadly creature, the box jellyfish, which is abundant in tropical estuaries and along beaches. The Irikanji, a tiny button-size jellyfish, is also found on many beaches and offshore waters. It has killed several people in the last decade. The bite is akin to a wasp sting, but that is where all similarities end. The pain sets in about 20 minutes later with cardiac arrest following in severe cases. To date there is no cure...

While most southern 4WD adventurers prefer the milder climate of their own summer, some do head north in the wet season - just for something different. The weather is hot and humid and people spend time on the beaches trying to cool down, some totally ignoring the very visible warning signs. I recently came across a couple who hailed from Bathurst on Bloomfield Beach, south from Cooktown. The Wet had started with a few storms but tracks and roads were still open.

A mate and I had unloaded our quads and we rode along the long beach tossing lures in the lazy surf where an incoming tide was bringing fish in. One gutter held several box jellyfish; one big enough to fill a plastic bucket. About 200m away, near the mouth of a small creek, I saw the couple slumming in the shallows drinking beer. They were having the time of their lives. I rode over and said G'day. Both were friendly and I informed them about the box jellyfish that they shared the sea with.

Incredibly they had no idea. They had seen the signs and had no clue of their meaning I also told them that crocodiles are more active than usual in the Wet as they are breeding.


"Crocodiles, what crocodiles," exclaimed the woman, "We haven't seen any at all. Some Aboriginal kids were swimming at the Bloomfield River causeway where we came off the Bloomfield Track. I thought that there would be no crocodiles if they swam."

"They do it all the time," I replied, "But a few are taken by crocs, and others are killed by jellyfish each season, especially in Arnhem Land. I guess they accept the danger more than we do, plus they are more at ease with nature and therefore more

aware of the danger. Though there are usually a few swimming about the beach here also, but I haven't seen any, probably because the tide is pushing in and with it box jellyfish. That alone is a good reason to stay out of the water."

I explained that they were putting themselves in dire danger. I also advised them not to swim in remote upland creeks like the ones they had crossed on the Bloomfield Track, or local swimming pools. These two were innocent about the danger the north poses and unknowingly had put themselves in dire danger.

In fact I would give an educated guess that the majority

of 4WDs heading north don't have much of an idea about the hidden dangers that await them if they lose caution. Most everyone is tuned in on crocodiles and snakes, but box jellyfish have killed more people than crocodiles and sharks combined. That alone is a good reason to take care when travelling in the tropics during our Wet season months. And if you insist on wading or swimming in the danger period, at least take a couple of litres of vinegar with you. So far it is about the only effective treatment use to combat a box jellyfish sting, but don't use it for other stingers. Seek medical help ASAP if stung. 

Take note of the warnings when in the tropics





KID'S CORNER

KIDS, SEND YOUR WORK IN TO:

Captain Chaos
c/o 4WD Action Magazine
37 Carnarvon St,
Silverwater, NSW 2128

G'DAY KIDS CAPTAIN CHAOS HERE!

Graham has convinced the guys to come on another adventure. This time he needs your help to drive Project GU through Forster! You can help him by completing this issue's maze. I also added a "Spot the Difference" photo where you need to circle the bits missing from the photo. When you're done head to www.4wdaction.com.au/kidscorner for the answers. Don't forget to let me know how you went with it and get your mum or dad to take a photo of you next to your 4WD or draw me a picture of your favourite 4WD so we can all see what you go bush in! While you have your thinking caps on, don't forget to write me a few words telling me what you go bush in and where you've been!

On ya kids!

KIDS,
KIDS, DON'T FORGET
TO SEND IN A PHOTO
OF YOURSELF AND
YOUR 4WD SO THE
WORLD CAN SEE WHO
DOES ALL THESE
AWESOME
DRAWINGS!

Due to the enormous
amount of mail I receive, I
can no longer send all of your
letters back to you, so please
take a photo or scan it into your
computer before you send it.

ON YA, KIDS!

TOBI AND DANIEL ZAGRABA

HI CAPTAIN CHAOS

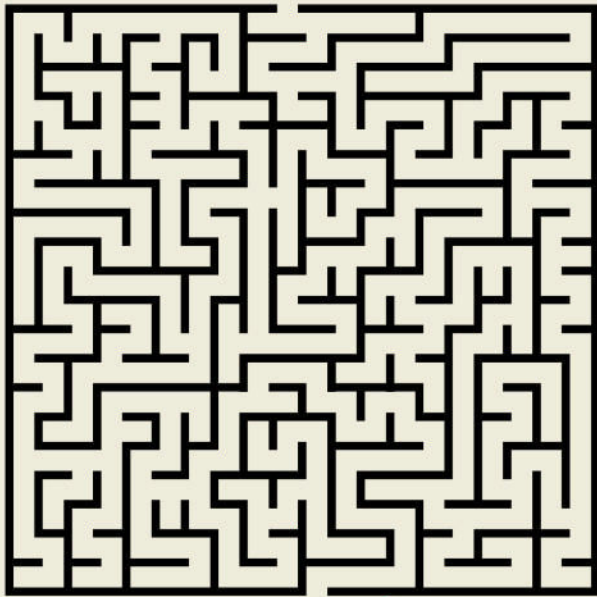
This is a photo of me and my brother Tobì. Our oldest brother Emil is our sole caregiver since our mum passed away from cancer. We go out to the bush every second weekend in Emil's D22 Navara. We love going to Ripley (Qld) where we have a great range of tracks and mud holes that we all like to play in, we also love going to Glasshouse and spending a full day out exploring. Those pictures were taken just behind our house at Spring Mountain where there's a little hill climb that we go to usually after our brother has fixed something broken on the Navara to test it out!

G'day Tobì and Daniel, what an awesome truck your brother has! I'm super jealous. It's good to hear that you go out on the tracks as a family. There's definitely going to be a couple more 4WDers on our hands very soon. Keep on 4WDing and look after each other.
Captain Chaos



CAPTAIN CHAOS'S MAZE

START



FINISH

KIAH AND COEN

Hi CAPTAIN CHAOS

This is a photo of me and my brother Coen in front of my dad's 90 Series Toyota Prado. We love 4WDing as we get to camp out under the stars and play in the mud. Today was a mud day with the mighty 90 at Riverstone.

G'day Kiah and Coen, what a ripper 4WD your dad has! It's great to see that you guys love to get out there camping and having a play on the tracks. I mean who doesn't? I think every day should be a mud day, so keep getting out there and having fun guys.

Captain Chaos



TRENT FARNHAM

Hi CAPTAIN CHAOS

My name is Trent Farnham, and I'm 10 years old. I'm from Esperance in Western Australia, so we go 4WDing a lot. This is a picture I have drawn of our Mitsubishi Triton. I really like them, especially when we go 4WDing, they rock!

G'day Trent, what an awesome drawing you've done there. It looks like you have got a very well setup Triton by the looks of that drawing. Keep up the good work mate and we might see you out there one day in your Triton.

Captain Chaos



SPOT THE 10 DIFFERENCES

After you have circled all of the missing bits from the photo, get onto the computer and click on www.4wdaction.com.au/kidscorner.



NEW PRODUCTS

Got a new and exciting 4WD product that you'd like to tell the world about?

We're always on the hunt for new and exciting 4WD products to review or write about in 4WD Action magazine. It doesn't matter how big or small your product is, if it's new – we want to hear about it and so do Aussie 4WDers!

How do you get your product featured? Simply send us an email with a brief description and good quality image of your product to products@4wdaction.com.au.

NEW COMPACT 12V FRIDGE / FREEZER

Compact, lightweight and efficient, the new WAECO CFX-28 is a perfect travel companion for any trip

If you're heading away for the weekend you might not want to throw a huge fridge into your 4WD. On the other hand if you're packing for remote touring, extra fridge space might be exactly what you need. That's why the WAECO CFX-28 is the perfect all-rounder. Use it as a stand-alone fridge or freezer for shorter trips, or make use of its compact size and use it in the 4WD as a second fridge or freezer for long trips to easily grab drinks or snacks while on the move. Throw it in the ute for a quick weekend with the boys, keep the wine cool for a beach run with the missus or strap it in the back to keep the kids happy on long trips, the compact CFX-28 packs a punch!

WHAT IT FEATURES

- Genuine WAECO compressor with integrated AC electronics
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- 12/24V DC and 240V AC operating modes with USB charging outlet
- 3 stage battery protection
- Optional quick release mounting kit so you can easily move the CFX-28 when you get to camp
- **Dimensions:** W342xH425xD552mm (D620 including handles)
- **Weight (net):** 13.1kg

To find your nearest WAECO retailer, or to find out more about the extensive range of WAECO products to suit your on-board and outdoor needs, including portable refrigeration, mobile power and kitchen solutions and automotive accessories, visit www.waeco.com.au or free call 1800 21 21 21.



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WHAT IT FEATURES

- Compact size – only 73mm x 73mm x 31mm
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- Low power use – only 0.68 Amps current draw at 13.8V
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TYRES FOR ANY TERRAIN

Built to endure the toughest terrain, Maxxis' new MT-764 Bighorn combines modern technology and design with the good old fashioned ability of a set of off-road muddies. Deeper tread with a dual stage tread design and multi-edge tread blocks mean extra steering control, more bite and enhanced self-cleaning – all that adds up to a tyre that's at home tackling anything you can throw at it. Suited for a mix of 80% off-road and 20% on-road, the MT-764 Bighorn is ready for tough weekends, punishing touring trips or anything in between.

WHAT IT FEATURES

- 3-ply side wall protection on specified sizes
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- Multi-stage shoulder design for reduced noise and added shoulder strength
- Dual stage tread design means more bite with less weight, extra steering control and better self-cleaning
- Multi-edge tread blocks offer excellent traction on any terrain
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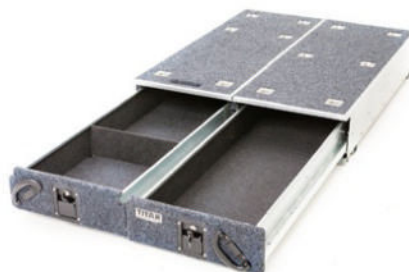
UTE BEAUTY STORAGE

From 4WD Supacentre comes tough-as-nails Titan Rear Drawers to fit all dual-cab utes

A dual-cab ute with a canopy is perfect for the bush – it gives you all the comforts of a wagon with all the storage of a ute. The Titan rear ute drawers from 4WD Supacentre maximise the space inside your tub. Featuring an in-built fridge slide, double roller bearings, marine carpeting, heavy duty locks and a galvanised steel frame, they've over-built them to handle the bush. The ute drawers come with a full DIY fitting kit included and can be fitted by one person at home in under three hours.

WHAT THEY FEATURE

- **Measures:** 1000w x 1300d x 240h
- Quality double roller bearings
- Strong galvanised steel frame
- Built in fridge slide measuring: 500w x 1300d
- Locking handles and strong tie down points
- Heavy duty marine carpeting inside and out
- Includes a full DIY fitting kit that one person can fit themselves with basic hand tools



The most you'll pay for Titan Rear Ute Drawers is \$795. For incredible combo deals and even better daily savings, head to www.4wdsupacentre.com.au or phone 1800 88 39 64.



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Don't forget to send in a photo of you and your truck for your opportunity to win.

[DRIVER PROFILES]

We'd love to see you and your truck! Simply send us an image of yourself and your pride and joy along with a description of why you love your fourby, and what you have done to it. Be as creative as possible! Be sure to include a little information about yourself, and where you like to go when you head off-road. Send your emails to editorial@4wdaction.com.au



WINNER

TYLER'S GRAND CHEROKEE

"With our second child on the way, the time had come to part with my beloved Kingswood Ute", writes Tyler. "I decided to get something more practical for our growing family. So a 4WD was the obvious choice. I picked up this 1998 Jeep Grand Cherokee bog stock from a lady using it to shuttle her kids around, and I never intended on doing any serious 4WDing in it. One day I went to explore some of our local tracks (just to see what it was capable of), and let me tell you the bug well and truly bit and I've been hooked ever since!"

"I quickly set to work on modifying the Jeep. Being a sheet metal worker I was in the right industry to self-fabricate a lot of what I need. I have most recently finished the winch bar I made up at work during my lunch breaks (big thanks to the boss!). I don't know many other people with 4WDs. I do a lot of 4WDing by myself and with the family, so the winch was essential. A few other mods include a 2in suspension lift, light bar, custom 2 1/2in exhaust, 245/75R16 Cooper Discoverer STs, and a snorkel. I also have many future mods planned!"

"Going bush is becoming quite the family affair now that the Mrs and kids are getting involved, my 2year old daughter loves coming and getting dirty with dad and my now 4 month old son went out for his first trip recently. I'm proof you don't need the biggest and best of everything to have fun. It's amazing where a 2in lift and some decent tyres will take you!"

Mate you're completely right that you don't need to have the biggest and best of everything to get out there. It's awesome how all the work done to the truck is your own. All the best with the Jeep mate, they go hard!

MATTHEW'S GQ UTE

"This is my 1998 GQ TD42D Nissan Patrol Ute", writes Matt. "The Patrol has a 5in Flexy Coil lift kit with 14in Profender shocks all around, running on 33in BF Goodrich KM2 tyres. I've put a big Garrett GTX2871 turbo and top mount intercooler on her, which runs on 15psi boost, so she runs like a dream. Some other mods I have done to the truck include a stainless steel snorkel, 80 Series extended bump stops, rear coil tower brace and retainers and custom 10in braided brake lines."

"I'm an apprentice mechanic, and love driving the hard tracks with mates. I love the adventure! I would love to one day run the tracks with Graham and the boys, that's on my bucket list!"

What a beast you've got there mate! Great to see you love getting out and giving those hard tracks a crack. Keep on 4WDing mate, one day we'll see you out there!





DALE'S PATROL UTE

You gotta love a big Patrol Ute, don't ya! Meet Dale, the proud owner of this 2001 Nissan Patrol ute. "It's done 295 thousand kilometres," writes Dale. "It is still going strong!"

"She has a 4in lift running on 35's, a custom winch bar and custom winch, with Light force HID spotlights".

"The best trips I've had in my lovely Patrol are out the back of Thompson Dam and out the back of Wallhalla. I normally just head out the back of home out to Willogrove for a day trip or two, cheers!"

Great truck Dale, she's a beauty. That thing will go forever mate if you treat it right, which I'm sure you will. Keep on getting out there in your ute!

ANTHONY'S 80 SERIES

"This is my 1995 GXL 80 series" writes Anthony. "Originally it had a 1HZ, I installed an aftermarket DTS turbo kit, and after blowing the standard turbo I have upgraded to a Garret T28 roller bearing turbo currently running 12- 15psi. It started out with a 4in lift all-round with Tough Dog springs and shocks. I have recently upgraded the rears to 5in due to the weight in the back. It's running 305/70/16 Cooper STTs, with a RUNVA 12000lb winch. For lighting I'm running a small 20in light bar up front with 2 IPF Extremes."

"I have custom rear drawers that I have made myself, so my first trade as a cabinet maker came in handy! An ARB twin compressor and an on-board 9L air tank keeps the tyres filled with air and the odd blow out of the air cleaner on long trips. I also fitted an inverter to charge iPads/laptops, and a few other 12v outlets and volt gauges. On the roof I have an ARB rooftop tent and a modified roof cage that holds my high-lift, shovel and the ARB awning."

I've owned her for the past five years and slowly getting there. We are aiming for a July trip next year, as it is my second 4WD it is purely for getting out there on weekends and the occasional week trip. I mostly go down to Nowra as my parents live five minutes away from all the famous tracks such as Monkey Gum and so on. As I'm living in the shire I head out to Boat Harbour nearly every weekend to take the dog for a run, any other weekend I am usually either at Lithgow, Rydal and Oberon, or up to Bylong 4WD Park."

Awesome 80 mate, what a weapon. It sounds like you've put a tonne of work into her, and putting it to good use too. All the best with the truck in the future.



CHEVY'S FORD COURIER

"This is my 2003 Ford Courier", writes Chevy. "It's a 2.5litre turbo diesel. Nothing really crazy about it, I've put bigger tyres on it which are 265/75R16 Bridgestone Duelers M/TS. These tyres are awesome for my 4WD and never fail to grip. I got some custom bar-work made up which includes a bullbar and rock-sliders. For lighting I have a 50in LED light bar and a pair of X-Ray spotties. Some other mods I've done to the Courier include extended shackles in the rear, some diff breathers and a snorkel. Future mods are most likely a lift and dual batteries, as well as a roof console, and I'd really like some storage space for the ute."

"I've been to Glasshouse Mountains a few times and really love it out there, also been to Ripley a fair bit. I really want to get out to LandCruiser Park. I also want to get over to Bribie Island as well as Fraser, once I get my rig set up!"

Gotta admire your passion for your truck mate, looks like it kills it out on the tracks. Keep on building her up and getting out there.

DANIEL'S TROOPY

"This is my pride and joy, a 2008 model Troopy that is a work in progress", writes Daniel. "I am currently setting it up for touring. It has a few mods to make life a little easier out on the tracks. So far, under the bonnet is fairly standard with the exception of a second battery setup and a secondary fuel filter. On the outside it has a 2in lift from Ironman with foam cell shocks all round. It sits on some 265/75R16 Hankook mud terrains on a set of black zero offset sunnies. The Troopy has a set of Lightforce 210 genesis HID's and a set of Beamax LED's set to the side for those hopping rats. It has an awning bolted up to a set of roof racks that were designed and made by me, and on the rear it has an Anderson plug that connects my 160W solar panel to the second battery, either under the bonnet or directly to the camper trailer battery."

Future mods include an exhaust, winch, side rails with custom rock sliders, guard flares and about a million other things!"

So far our travels have taken us up to the Cape, Darwin, around the Gulf, and to Fraser a few times. Future trips include my birth place of Nhulunbuy, the Simpson, Gibb River Road and the Kimberley, just to name a few."

What a ripper Troopy mate, gotta' love those things. Keep on building her up mate, and I'm sure she'll be an awesome tourer to get out and see our country.



OOPS

MOMENTS

WINNER!
MATT KRUGER.
 VIA EMAIL



"This is my oops moment, a roll over and recovery on the Rocky Trail, Mt Coramba. My back end slipped off line and pushed the front up a stump. My mates and I travelled nine hours from the middle of Queensland to Coffs Harbour for a week away. This happened on the first day. It didn't dampen our spirits though! We picked her up and kept hitting the tracks for the rest of the week. Big shout out to the local boys Mark and Jarod for showing us around and helping out with the recovery!"



"My oops moment occurred in November 2010. Julie and I went to see the Eyre in full flood and returned via Birdsville, the Bore track to Innamincka and then eventually to Wanaaring. Here we camped up for a few days, fishing and catching yabbies on the Paroo River.

While following a vague "track" along the river bank Julie thought that it looked a bit soft ahead. I thought it was just a bit green and didn't bother to get out to check. Metres later we were in mud up to the axles. Julie took these photos in between laughing her head off at my predicament of having to winch and dig the Disco out!"

IAIN BOYD.
 VIA EMAIL



BRENDAN CLARK.
VIA FACEBOOK

"A few mates and I decided to try out a different track just off Toodyay Road in Redhill Western Australia. We noticed a semi challenging hill off to the left. We got to the base of the hill and picked out the route we would take, and as I got near the top I got stuck in a rut. I needed to get to the right a little more. That's when the oops moment happened. I rolled back about 10 metres. Flipping the 4WD back over was pretty easy. We attached a snatch strap to the front recovery point and looped it around a boulder to prevent it rolling down the hill, another strap to the high side of the chassis and the other end to a mate's Patrol. We gave it a gentle tug to get it on all fours again, and drove the old girl home without a windscreen!"

OUR OOPS MOMENT

Talk about a monumental stuff-up. Brenno hit a bog-hole in the Pigpen at Cruiser Park in this issue's DVD too hard, and Blind Freddy could have seen what was coming. Fan through radiator, coolant through gaping holes in radiator. This is the patch-up job – an hour on the cordless angle grinder and every tube of silicon we could find. A massive thanks to Mic, Tamara's husband, for helping with the repair. Did it work? Sort of, in the same way leaving your beers in the sun to cool down sort of works. Brenno, you're one big Oops Moment mate.



"This is my oops moment recently on our Cape trip on the Old Tele Track. We started the track from Bramwell, and the 3rd creek in this happened! Luckily only a dent in my roof and my awning, I was back on all 4 wheels in a few minutes thanks to the quick thinking crew I was with. I definitely learned a lesson and learnt a lot about my 4WD on the trip. It was a ripper of a trip and would do it again in the drop of a hat!"

ANDREW SOUTHERN.
VIA EMAIL



TAMARA BURGER.
VIA FACEBOOK

"In October 2015 Conrad, Savannah and I headed to Harvey, Western Australia on our own for a day out. We had tried to organise a group, but no one else made it. We came across a very steep hill climb, which we actually struggled to walk up, so in the spirit of 'let's give it a go' up we went. We ended up bellied out, with all four wheels in the air. Oops! Luckily we had recently fitted our 12000lb Grande MkIII winch from 4WD Supacentre, so we were able to winch out of there. It could've been a much bigger oops."

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▼ BIG BORE ADJUSTABLE SHOCKS

If you have a full-size 4WD with raised suspension and you carry heavy loads, tow, or just need superb control in any conditions, these shocks are unbeatable. The Tough Dog big-bore shock has a 70mm outer case, a whopping 45mm piston, and is ride-adjustable via an external 9-position knob. This specification provides real control and rapid dispersion of heat.

\$275 each. FREE-DELIVERY

▼ NITRO SHOCKS

Designed with control & comfort in mind. These shocks work well to provide you with a balanced, controlled, sway-free ride. The shock will automatically adjust itself to the road conditions to deliver a softer or firmer ride as the terrain dictates. So when you're around town and want a softer ride, you've got it! When you want your vehicle to perform off-road, you also have the control that you need. Priced competitively and excellent quality, these shocks are perfect for the light to medium 4WDs with leaf-sprung suspension.

\$125 each. FREE-DELIVERY

▼ FOAM-CELL SHOCKS

The winner of 4WD Action magazine's 19-page torture and comparison test. These shocks have a large bore (41mm) and are built for heavy-duty use and for coil-sprung vehicles. The use of a micro-cellular foam insert has produced a new breed of shocks, which are more resistant to fade. Provides more control than your regular 35mm bore product. These Tough Dogs are one of man's best friends.

\$160 each. FREE-DELIVERY

▼ COIL SPRINGS

Tough Dog coils are not available for Commodores, Falcons and Pulsars etc. The Tough Dog team's expertise is in 4WD suspension applications. And that is why no other coil spring brand can match the 'intelligent design' of the huge range of coils. They are available to suit may 4WDs from Daihatsu Feroza to mining-spec Toyotas and Nissans.

From **\$240 (pair) FREE-DELIVERY**

▼ TORSION BARS

Tough Dog torsion bars dramatically increase ride-quality and control as well as restore the spring action 'lost' via "cranking" the original units. Using the very best steel, these bars make your 4WD ride better regardless of how light or heavy the load on them.

From **\$250 (pair) FREE-DELIVERY**

▼ EXT STEERING DAMPER

Unlike cars, most 4WDs need a steering damper to control front-end shimmy and/or wide tyres that often seem to have a mind of their own, especially on back roads. The heavy-duty EXT has a larger bore size than most original dampers. This means more control, better handling and less driver fatigue. EXT dampers bolt up to the existing mounts, so fitment is easy.

\$120 each. FREE-DELIVERY

▼ RTC STEERING DAMPER

The award-winning RTC (return-to-centre) steering damper is one of our best-selling products. The coil-over design helps keep the steering centred; no matter the road surface or terrain. For extreme applications, there is a big-bore RTC damper to suit some Landcruisers, Patrols, and F250s.

\$165 or \$300 (big-bore version) FREE-DELIVERY

▼ LEAF SPRINGS

Tried, tested and proven in the harsh conditions of the Australian outback. Tough Dog springs provide the performance and long-term durability your 4WD demands.

Each leaf is formed to a template, oil quenched, hardened and tempered before being assembled. The spring is then scragged and load tested to ensure that the spring retains its height. Provides around 50mm lift and available in a range of designs depending on your load-bearing requirements.

▼ KING OF BIG KITS

Premium quality 4" (100mm) 5" (125mm) & 6" (150mm) suspension kits. For the serious off-road enthusiast who knows what's what! Kit includes 45mm Tough Dog adjustable shocks, Tough Dog coils, 3 degree castor bushes (or plates for 5-6" kits), adjustable panhard rods, transmission spacer (Patrol) and extended brake hose kit. Optional upgrades with spring rates, steering damper, abs compatible brake hoses, sway bar extensions or drop boxes.

▼ 'FAST-FIT' STRUTS

The new 'fast-fit' Tough Dog strut units make fitting a breeze. Instead of fitting the coil to the strut yourself, you buy the strut and spring already fitted together. No more struggling! Includes the Tough Dog coil design of your choice, upper spring seat and bearing plate, bushes and mounting hardware. From **\$390 each. FREE-DELIVERY**

CHOOSE FACTS OVER FICTION



4WD Action magazine (#165) featured a 19 page torture and comparison test of the 10 best selling 4WD shocks. Tough Dog shocks "collared" the competition and were awarded 1st place, in a line up that included Koni, Bilstein, Old Man Emu, Ultimate, Raw and TJM.



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